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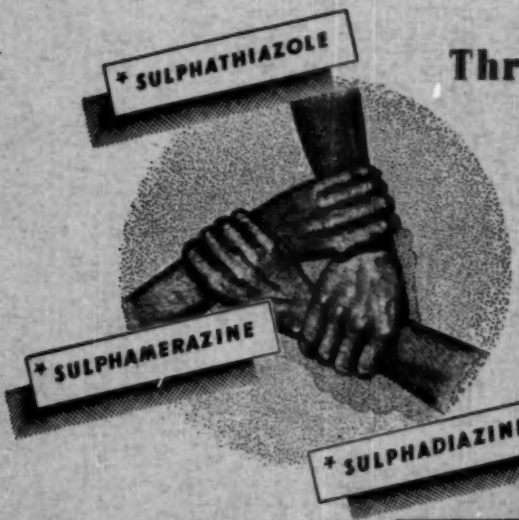

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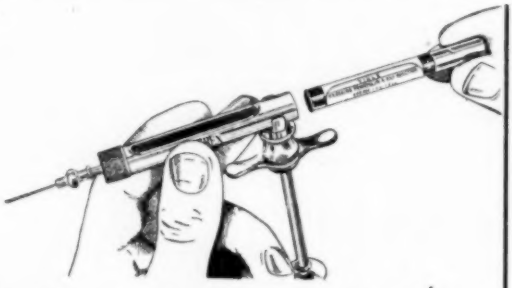

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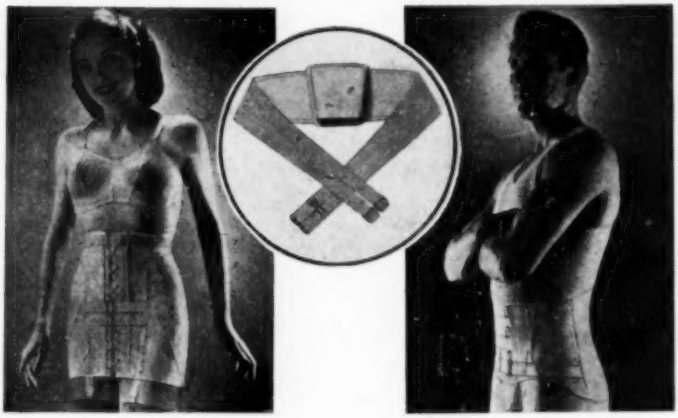

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REFERENCES :

1. Ann. New York Acad. Sc. (Sept.) 1950
2. Proc. Soc. Exper. Biol. & Med. (June) 1950
3. Proc. Staff Meet. Mayo Clin. (April) 1950

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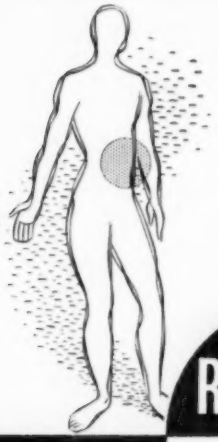

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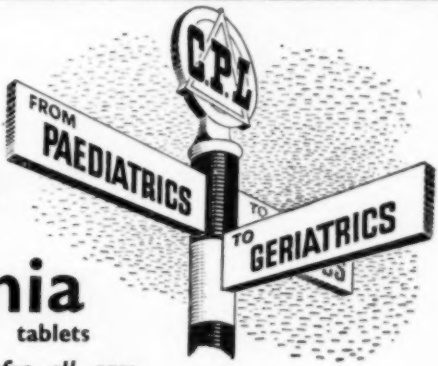

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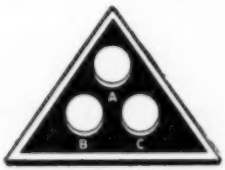

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NULACIN TABLETS, allowed to dissolve slowly in the mouth, have been shown clinically to provide a continuous neutralization comparable with that of drip therapy. (B.M.J., 1952, 2, 180.)

NULACIN TABLETS contain nutrient in a most acceptable form to the peptic ulcer patient. They obviate the necessity of taking frequent feeds, and so lessen the tendency to obesity in those following a dietary regime of food at frequent intervals.

During ulcer activity the suggested dosage is 3 tablets to be sucked each hour, and for follow-up treatment 2 tablets should be sucked between meals, beginning half an hour after a meal.

The tablet is of a suitable size, and of a consistency and hardness, so that, when it is sucked, the result is a constant and prolonged neutralization of the gastric juice.

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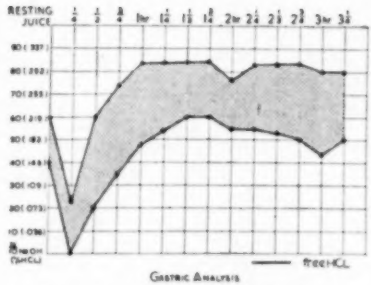
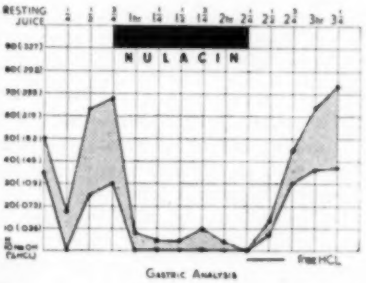
NULACIN TABLETS are available in dispensing units of 25, *free of Purchase Tax.*



Superimposed gruel test-meal curves of six patients with duodenal ulcer.



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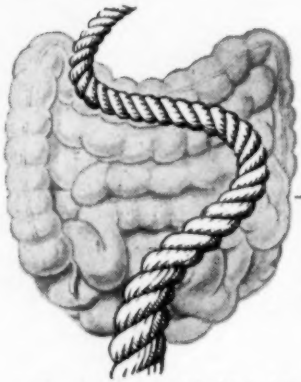

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PEPSIN AND ACID, although not the ultimate cause of peptic ulcer, create the corrosive medium which prevents the healing of the ulcer and jointly make possible its continuance and recurrence. The fundamental factor is, therefore, to control the action of pepsin in a highly acid medium and to create an environment which permits the ulcer to heal. Gastric corrosion can be stopped instantly by 'ALUDROX' therapy which neutralises excess acid and partially inactivates pepsin but leaves the stomach in a sufficiently acid condition to allow normal protein digestion. 'ALUDROX' promptly relieves pain and in conjunction with a bland diet and rest ensures rapid healing of the ulcer.

'ALUDROX, is available in two forms: as an amphoteric gel in 6 oz. and 12 oz. bottles and as tablets in boxes of 60.

'Aludrox' *Trade Mark* ***Aluminium hydroxide gel***

JOHN WYETH & BROTHER LIMITED,
CLIFTON HOUSE, EUSTON ROAD, LONDON, N.W.1

Wyeth

A new combination

CODIS

REGD.

soluble aspirin with codeine phosphate and phenacetin

Codis presents a familiar grouping of analgesic drugs; aspirin, phenacetin, codeine phosphate; with an important advantage. The "aspirin" in Codis is rendered soluble, as in "Solprin".

Placed, uncrushed, in water, a Codis tablet disperses in a matter of seconds to form a solution of calcium aspirin and codeine phosphate with finely suspended phenacetin. The chance of irritation of the gastric mucosa by undissolved particles of aspirin is thus minimised.

Codis is recommended for all those conditions for which Tab. Codein. Co. B.P. would be prescribed. It has the added advantages of greater ease of administration and far less likelihood of aspirin intolerance, while the rapid absorption of the soluble aspirin promotes prompt relief.

COMPOSITION

Each Codis tablet contains: Acid. Acetylsalicyl. B.P. 4 *grs., Phenacet.* B.P. 4 *gr. Codein Phosph.* B.P. 0.125 *grs., Calc. Carb.* B.P. 1.2 *grs., Acid. Cit.* B.P. (*Exsic.*) 0.4 *grs., Excip. ad.* 11.45 *grs.*

Codis is not advertised to the public.

DISPENSING PACKS: (Purchase Tax free) Hospital bottles of 400 tablets 18/6 each. Prescription box of 300 tablets in distinctive gold foils of 6 tablets each 16/6 per box.

PUBLIC SIZES. Bottle of 20 tablets 2/9 each inc. P.T. Carton of 20 tablets (5 distinctive gold foils of 4 tablets each) 2/9 inc. P.T.

RECKITT & COLMAN LTD., HULL AND LONDON. (PHARMACEUTICAL DEPT., HULL)

When side effects are an obstacle to treatment....

. . . the administration of a combination of Veriloid with phenobarbitone enables Veratrum therapy to be continued successfully in a majority of those patients who cannot tolerate Veriloid alone because of frequent nausea.
The two substances are now available together as Veriloid-VP, each tablet of which contains 2 mg. of Veriloid with 15 mg. of Phenobarbitone B.P.

VERILOID-VP

VERILOID WITH PHENOBARBITONE

IN ALL DEGREES OF HYPERTENSION

Given concomitantly, phenobarbitone raises the threshold of tolerance of the Veratrum alkaloids and relieves the emotional tension which is so often present in the hypertensive patient. Therapeutically effective doses can thus be given with little or no side-effects.

Dosage of Veriloid-VP is adjusted to individual requirement, an average dose being one to one and one-half tablets four times daily, after meals and at bedtime.

Reference: *Lancet*, 261 : 1002 (Dec.) 1951.

Veriloid-VP is available in bottles of 100 and 500 scored tablets.

NOTE

Veriloid, plain, remains available as before in tablets of 1 mg. and 2 mg. Veriloid is a unique biologically standardised fraction of Veratrum viride and has been used with marked success in all forms of hypertension. Blood pressure is significantly lowered, without loss of the postural reflexes essential to normal living. Great relief of subjective symptoms is a common feature of therapy.

"Veriloid" is a Trade Mark of

RIKER LABORATORIES LTD. 29 KIRKEWHITE STREET NOTTINGHAM

Descriptive literature gladly sent on request

THE SPASM CAN BE CONTROLLED

Prompt measures to counter the distress of persistent coughing are well-merited. Taoryl — a recently introduced, powerful antispasmodic in tablet form — combines peripheral sedation with a selective inhibitory action on the cough centre. Safe to use for long periods without addiction, it provides highly effective therapy in all cases of irritant and spasmodic cough. It is comparatively non-toxic, free from side effects in normal dosage, and readily administered to children.

Literature and clinical sample on request.
Bottles of 20 and 200 tablets.
Prescribable on N.H.S. Form E.C.10

Geigy

TAORYL

TRADE MARK

Bis [1-(carbo-β-diethylaminoethoxy)-1-phenyl-cyclopentane]-ethane disulphonate.

PHARMACEUTICAL LABORATORIES GEIGY LTD.
Rhodes, Middleton, MANCHESTER
PH.44

Falling Leaves....
changing temperatures increasing incidence of coughs and colds. BENYLIN EXPECTORANT is the answer: it's a rational and effective preparation for the relief of unbeneficial cough associated with bronchitis, colds, laryngitis, tracheitis and other respiratory complaints following in the wake of advancing winter. It is suitable for both adults and children.
Supplied in bottles of 4, 16 and 80 fluid ounces.
Benylin
EXPECTORANT

Parke, Davis & Company, Limited *Inc. U.S.A.* Hounslow, Middlesex

Telephone Hounslow 2361

4A

Many aged people, though retaining their interests in life, lack the initiative and physical strength to translate inclination into action. They are notoriously exacting and difficult.

The administration of a reliable and palatable tonic often helps to add 'life to years'. 'Neuro Phosphates' might well have been specifically designed for the aged, its outstanding palatability makes it acceptable to the most exacting patient. Recommended dosages: Two teaspoonfuls, with water, t.i.d. before meals.

'Neuro Phosphates' ('Eskay')

prescribed so widely because it works so well

MENLEY & JAMES, LIMITED, COLDHARBOUR LANE, LONDON, S.E.5

for *Smith Kline & French International Co., owner of the trade marks 'Neuro Phosphates' and 'Eskay'*

NP102

For Respiratory Failure in Emergencies . . .

LOBELINE-SANDOZ

Lobeline-Sandoz stimulates respiration and is indicated in respiratory failure due to poisoning, narcosis, infection, electrocution, drowning, etc. It has proved to be a safe and reliable respiratory stimulant in asphyxia of the newborn.

Lobeline-Sandoz has been successfully used in the treatment of allergic dermatoses such as urticaria, weeping eczema and serum sickness.

Intravenous injections of Lobeline-Sandoz may be used for the measurement of arm to carotid sinus circulation time.

Weak dose : Ampoules of 1 ml. containing 3 mg.
Strong dose : Ampoules of 1 ml. containing 10 mg.

Literature and samples supplied on request

SANDOZ

SANDOZ PRODUCTS LIMITED

134, Wigmore Street, London, W.1

When a child is learning to play a musical instrument he is appalled by the enormous number of "wrong" notes. He is mystified to understand why his teacher can play "right" notes, apparently without effort.

If he practises hard and is in the hands of a good teacher, his fingers, at first clumsy and faltering, become confident and accurate.

Similarly, a mother is dependent on her Medical Adviser for guidance in the feeding of her first-born.

Such guidance will, of course, be directed to breast feeding whenever practicable. In case of artificial foods the advice will be based on the doctor's personal preference, founded on experience.

We are very gratified that so many doctors have used our foods successfully in the past and continue to recommend them. This is undoubtedly due in large measure to the consistently high standard of quality which has always been our aim and which remains unaltered.

4949

COW & GATE MILK FOODS

Guildford, Surrey

Simple as a fairy tale

'Homicebrin' simplifies the prophylactic administration of the water soluble and fat soluble vitamins. It is specially designed for infants and children.

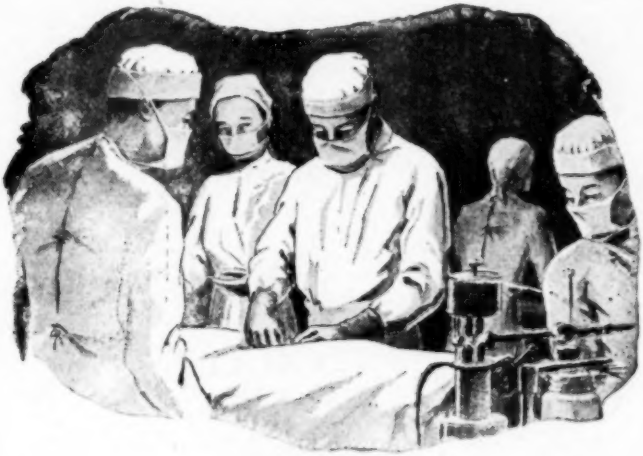
'Homicebrin' is extremely palatable and is miscible with milk, water and fruit juices. If desired it may be stirred into cereals or other foods.

'HOMICEBRIN' BRAND

Homogenised Vitamins A, B_1, B_2, C & D.
Supplied in bottles of two and four fluid ounces

Lilley
TRADE MARK

ELI LILLY AND COMPANY LIMITED, BASINGSTOKE, HANTS



Prevention of Dressing Trauma

Jelonet is a dressing for all wounds—its non-adherent properties protect the delicate epithelium and prevent dressing trauma, enabling healing to continue undisturbed. It is used extensively in the treatment of burns and as a dressing following skin-grafting operations. Other uses include: drainage, packing for deep granulating wounds, and as an adjuvant in the treatment of varicose ulcers by compression bandaging.

Jelonet may be prescribed by name under the N.H.S. (Form E.C. 10) in the following sizes:—single pieces in envelopes, tins containing 5, 10 or 36 pieces, each piece 3¼″ x 3¼″.

A special size tin containing a strip 8 yards long x 3¼″ wide, folded zig-zag, is available for Hospitals and Surgeries. Sterile—ready for immediate use.

JELONET

PARAFFIN GAUZE DRESSING, B.P.C.

Made in England
by T. J. SMITH & NEPHEW LIMITED, HULL

The Original and Standard Emulsion of Petroleum

Angier's Emulsion is made with petroleum specially purified for internal use. It is the original petroleum emulsion — the result of many years of careful research and experiment. There is a vast amount of evidence of the most positive character proving the efficacy of Angier's in sub-acute and chronic bronchitis. It not only relieves the cough, facilitates expectoration, but it likewise improves nutrition and effectually overcomes the constitutional debility so frequently associated with these cases. Bronchial patients are nearly always pleased with this emulsion, and often comment upon its soothing, "comforting" effects.

Angier's Emulsion

THE ANGIER CHEMICAL COMPANY LIMITED, 88, CLERKENWELL ROAD, LONDON, E.C.1.

Protective Covering

It has taken æons for the armadillo to develop an armour that gives comparative immunity to the perils that lurk in the jungles of the Amazon.

The modern ulcer patient is more fortunate. Almost immediately, Gelusil* Antacid Adsorbent coats the inflamed or ulcerated areas of the gastric mucosa against injury by the acid gastric juice. At the same time, Gelusil provides swift relief of symptoms through the physical adsorption of hydrochloric acid by aluminium hydroxide; magnesium trisilicate prolongs the antacid activity through chemical reaction. Constipation, so frequently associated with ordinary alumina gels, is absent with Gelusil tablets and Gelusil does not interfere with the absorption of minerals such as calcium and phosphorus from the diet. Finally Gelusil is both economical and palatable.

FORMULA — Each tablet contains Mag. Trisil. 7½ grs. Alum. Hydrox. gel 4 grs.

GELUSIL

In boxes of 50. Also for dispensing only in bulk packages of 500. Not subject to P.T. on prescription.

NO WARNER PREPARATION HAS EVER BEEN ADVERTISED TO THE PUBLIC

William R. **WARNER** *and Co. Ltd. Power Road, London W.4.*

In the treatment of the common cold

'SULFEX' *provides . . .*

. . . relief from nasal congestion

. . . prophylaxis against secondary bacterial infection . . .

The common cold is frequently the precursor of bacterial infections of the upper respiratory tract, and the primary virus often deprives its victims of the power to withstand secondary bacterial invasion.

'Sulfex' is a valuable ally in controlling or averting secondary infection. It promptly and effectively relieves nasal congestion, without giving rise to secondary reactions, and ensures adequate ventilation and drainage. The bacteriostatic action of the 'Mickraform' crystals of free sulphathiazole often aborts secondary bacterial infection and thus tends to avert the onset of dangerous complications.

Issued in 1-oz. bottles with dropper

'SULFEX' — *Vasoconstriction in minutes*
— *bacteriostasis for hours*

An aqueous suspension of microcrystalline ('Mickraform') sulphathiazole, 5%, in an isotonic solution of 'Paredrinex', 1%. (ph 5·5 to 6·5).

HENLEY & JAMES, LIMITED, COLDHARBOUR LANE, LONDON, S.E.5

SXP112 *for Smith Kline & French International Co., owner of the trade mark 'Sulfex'*

Thank you, doctor!

Auralgicin TRADE MARK **for the**

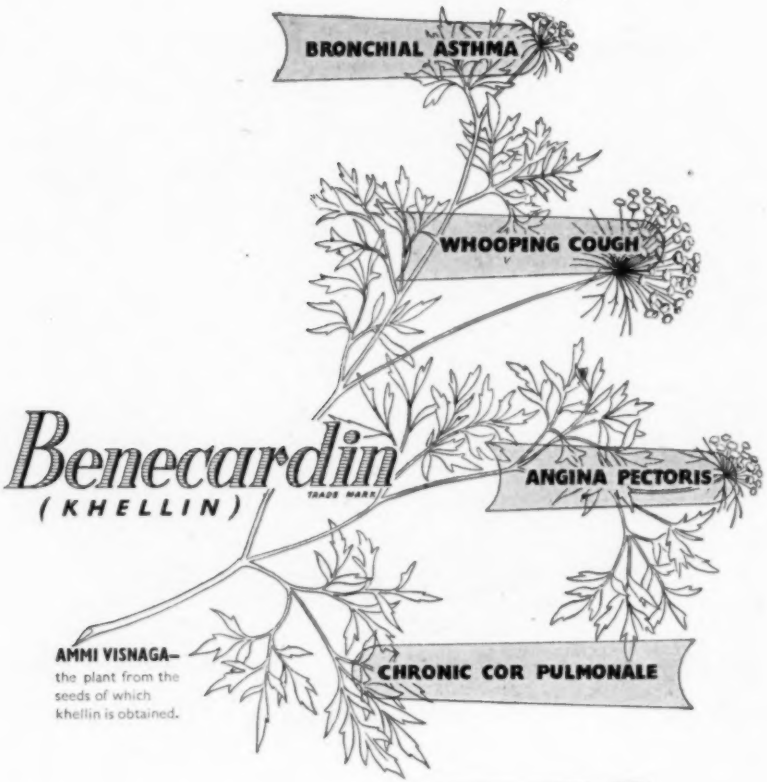
relief of pain in acute otitis media

—particularly in children

Benger Laboratories

In acute ear infections, few drugs are effective owing to their inability to reach the site of infection. By selecting an antibacterial substance with a wide spectrum of activity and combining it with agents which decongest, promote drainage and reduce discharge, this difficulty is overcome. Auralgicin ear drops were designed for this purpose—they have proved particularly effective.

BENGER LABORATORIES LIMITED · HOLMES CHAPEL CHESHIRE · ENGLAND



Benger Laboratories

PRODUCES sustained bronchial and coronary dilatation.

REDUCES frequency and severity of attacks.

INDUCES subjective and objective improvement.

★ Benecardin is available for oral or intramuscular administration. Literature on request.

BENGER LABORATORIES LIMITED · HOLMES CHAPEL · CHESHIRE · ENGLAND

Widely useful in everyday practice

DRINAMYL

'Drinamyl' ameliorates mood and relieves inner tension in cases of mental and emotional distress, particularly where anxiety is a factor. It is invaluable in the treatment of mild neuroses, and for the alleviation of somatic symptoms that are without organic basis. 'Drinamyl' relieves the symptoms of depression and anxiety, stimulating mental activity, and restoring optimism and cheerfulness, and an interest in life.

Samples and further information are available on request.
'Drinamyl' is available on prescription only, in bottles of 25 tablets—each tablet contains 'Dexedrine' (dextro-amphetamine sulphate) 5 mg. and amylobarbitone (gr. ½) 32 mg.

MENLEY & JAMES, LIMITED
COLDHARBOUR LANE, LONDON, S.E.5

for Smith Kline & French International Co., owner of the trade marks 'Drinamyl' and 'Dexedrine'

DLP62

"...and what about diet Doctor?"

Accurate, time-saving assistance in answering this daily question is freely available to the busy practitioner.

An indexed supply of standard diet cards, convenient for handing to patients, will be sent to any practitioner on request.

Special dietaries to suit individual needs are also gladly prepared on receipt of appropriate particulars.

These facilities are offered to the profession free of charge by

ENERGEN DIETARY SERVICE

DEPT. C.71 · 65 POUND LANE · LONDON · N.W.10

HYPON TABLETS

Rapid Disintegration*

Tablet manufacture is the art of compounding to produce a ready means of administering an accurate dosage in the most convenient form. In the case of an analgesic tablet it is important that this should disintegrate rapidly to provide quick relief from pain.

To comply with the British Pharmacopœia tablets must disintegrate within fifteen minutes under standard tests.

* **HYPON TABLETS, when submitted to these tests, disintegrate in less than twenty seconds.**

Prescribe HYPON TABLETS by name

Containing the well-known triad acetylsalicylic acid, phenacetin and codeine with the addition of phenolphthalein and caffeine to counteract side effects of depression and constipation, HYPON TABLETS provide a most effective analgesic for the relief of pain associated with rheumatic conditions, spastic dysmenorrhœa and neuralgia.

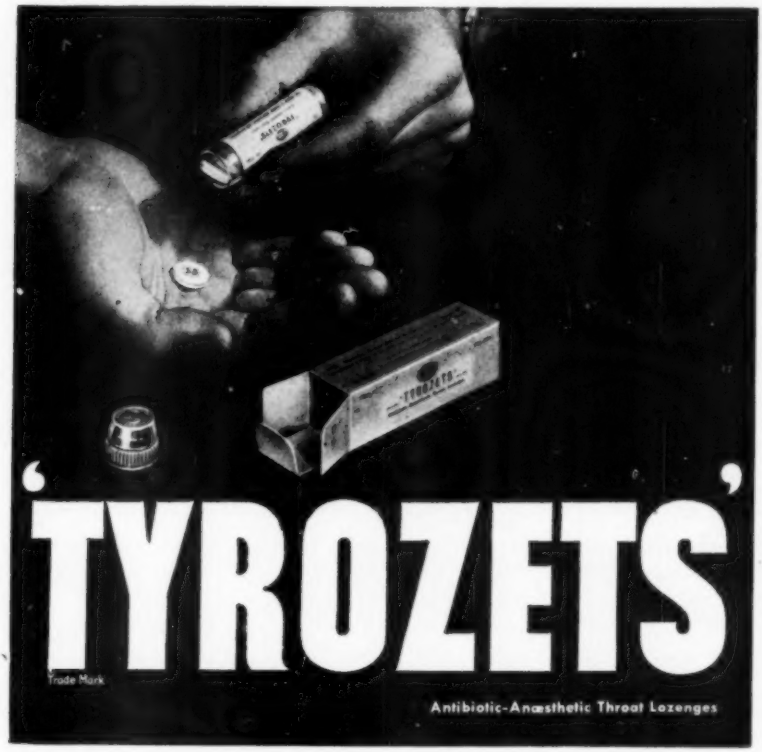
FORMULA: Acid. Acetylsalicyl. 40.22%; Phenacet. 48.00%; Caffein. 2.00%; Codein. Phosph. B.P. 0.99%; Phenolphthal. 1.04%; Excip. 7.75%. (Each tablet 8 grains).

PACKS: 10, 50, 125, 250, 600 and 1,000.

Literature available on request from the Medical Department:

CALMIC LIMITED · MANUFACTURING CHEMISTS . CREWE · Tel. 3251-5

C/H/6a



- Pleasantly flavoured and completely stable.
- Rarely cause sensitivity or produce resistant strains of bacteria
- Effective against bacteria usually encountered in oral and pharyngeal infections.
- Rapidly relieve irritation in mouth and throat.
- Each lozenge contains 1 mg. of the antibiotic *tyrothricin* and 5 mg. of the anæsthetic *benzocaine*.
- Packed in plastic tubes of 12 lozenges.

SHARP DOHME

Informative literature and clinical package gladly sent on request.

SHARP & DOHME LIMITED, HODDESDON, HERTS.

Lives of Quiet Desperation

Anxiety neurosis can take many forms and to the experienced practitioner diagnosis is not so difficult. Treatment is the real problem.

'Diesed', which is a combination of sedative ('Luminal' 32 mgm.) and euphoriant (methyl amphetamine 2.5 mgm.), helps by lessening emotional tension and improving the mood.

DIESED

TRADE MARK

Medical Literature available on request.

BAYER **PRODUCTS LIMITED, AFRICA HOUSE, KINGSWAY, LONDON, W.C.2**

Associated Export Company WINTHROP PRODUCTS LTD., LONDON

WHILE MAN SLEEPS

The badger emerges from its 'cete' or burrow, and makes nocturnal expeditions in search of its food. But some of mankind, too, are awake—unwillingly. Their problem is:

Soothing the cough that causes insomnia

IN TRACHEITIS and bronchitis the sleeplessness caused by a persistent, unproductive cough can be very exhausting. Tusana Cocillana Cough Linctus is very valuable in such cases. It provides a blend of expectorants to loosen the tenacious mucus in the upper air passages and the central sedative, codeine, to depress the cough reflex.

By breaking the vicious circle of coughing and irritation, Tusana allows the patient to sleep and gather strength for recovery. The tendency of codeine to cause constipation is offset by the inclusion of a little extract of senna in the formula.

Supplied in bottles of 4 fl. oz. — 2/10½d. and 20 fl. oz. — 10/7½d.
Net prices in Gt. Britain to the Medical Profession.

TUSANA

COCILLANA COUGH LINCTUS

Descriptive literature available from the Medical Department
BOOTS PURE DRUG COMPANY LIMITED, NOTTINGHAM, ENGLAND

Boots

S142

**FOR YOUR
PREGNANT PATIENTS
WITH NAUSEA AND VOMITING**

Nidoxital

is available in bottles of 20 and 100 capsules. Original prescriptions should specify no more than 20 capsules since this quantity is usually sufficient for complete control. Dosage : one capsule 30 to 45 minutes before meals in the usual case ; may be increased to 2 to 3 capsules in exceptionally severe cases.

For the 50% of pregnant women who suffer gastric distress. NIDOXITAL provides rapid relief. In almost all patients treated with NIDOXITAL, symptoms disappear within one to three days.*

Nidoxital

is rational therapy

Since the problem is complex, NIDOXITAL provides five effective agents for a full range of therapeutic and prophylactic action :

Benzocaine – to diminish gastric excitability
Nicotinamide – to reduce excessive peristalsis
Pentobarbital sodium – to depress central excitability
dl-Methionine – to support normal liver function
Pyridoxine – for fatty acid and protein metabolism, maintenance of nerve function and erythropoiesis.

Pyridoxine is reported by many clinicians to have a favourable effect in nausea and vomiting of pregnancy and is a firmly established agent in treatment of this condition.

LITERATURE ON REQUEST

* The use of Nidoxital in Emesis Gravidarum. Am. J. Obst. & Gynec. 59: 458, 1950

ORTHO

Ortho Pharmaceutical Limited

HIGH WYCOMBE · BUCKINGHAMSHIRE · ENGLAND

Makers of Gynaecic Pharmaceuticals

How to reduce the 'Time-Lag' in the treatment of Rheumatism

Despite half a century of painstaking research, there is still no unanimity of opinion regarding the causation of rheumatic diseases. Treatment is therefore necessarily symptomatic and directed to the relief of pain.

Massage has long been the treatment of choice. But in severe cases adequate massage cannot as a rule be begun at once; the affected muscles are too taut and tender. Days or even weeks may have to elapse before the patient can benefit from the stimulating effects of deep massage.

This 'time-lag' has now been eliminated by the use of Lloyd's Adrenaline Cream.

Gentle massage over the affected myalgic spots with this cream brings rapid relief from pain and permits of more intensive treatment than would otherwise be possible.

Supplies of Lloyd's Adrenaline Cream are now available through Boots, Timothy Whites & Taylors, and all pharmacists.

Howard Lloyd & Co. Ltd.

11 Waterloo Place, London, S.W.1

Makers of Fine Pharmaceuticals since 1880

For old and young alike

'SULPHAMEZATHINE'

SULPHADIMIDINE B.P. TRADE MARK

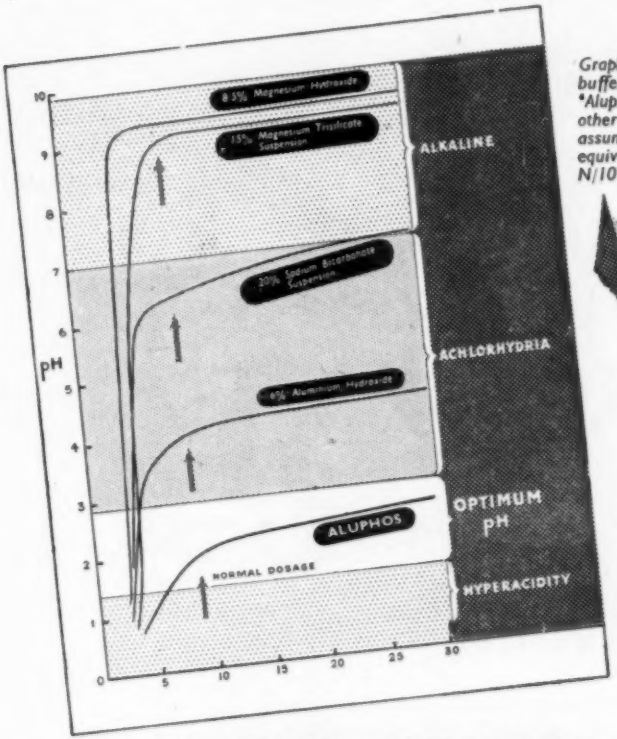
'Sulphamezathine' has a wide range of antibacterial action, and can be used wherever a sulphonamide is indicated. Toxicity is exceptionally low, and nausea, vomiting and other common reactions are rarely encountered. Renal complications do not occur. 'Sulphamezathine' is considered by many to be the drug of choice for children and elderly patients.

Available in the form of tablets (0.5 gm.); lozenges; oral suspension; powder; and as the sodium salt in sterile solution for parenteral administration.

IMPERIAL CHEMICAL (PHARMACEUTICALS) LTD.

A subsidiary company of Imperial Chemical Industries Ltd. WILMSLOW, MANCHESTER

ICI



Graph showing the buffering action of 'Aluphos' compared with other common antacids assuming that the equivalent of 100 mls. N/10 acid are present.

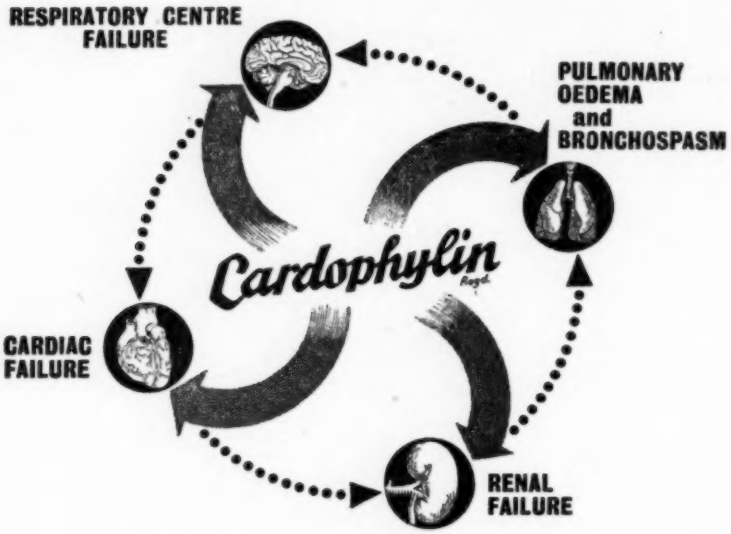
In the PEPTIC ULCER PATIENT
where hyperacidity must be controlled,
Aluphos ***provides effective pain relief***
but cannot produce acid rebound

Aluphos

(ALUMINIUM PHOSPHATE GEL)
the new, non-constipating antacid

Benger Laboratories

BENGER LABORATORIES LIMITED · HOLMES CHAPEL · CHESHIRE · ENGLAND



Versatility

in controlling the various

complications of Heart Failure

Benger Laboratories

Cardophylin *is distributed by Benger Laboratories Limited for the manufacturers—WHIFFEN & SONS LTD.*

Detailed information regarding the clinical applications of Cardophylin is available on request.

BENGER LABORATORIES LIMITED HOLMES CHAPEL CHESHIRE · ENGLAND

Prolonged

Local

Anaesthesia

A single injection of Efocaine PRODUCES CONTINUOUS LOCAL ANAESTHESIA AVERAGING 6-12 DAYS IN DURATION but frequently even longer. This important advance in the scientific control of pain is of particular significance in the post-operative period. A long-lasting depot anaesthetic is now available which does not rely on the use of oil, vaso-constrictor agents or gelatin as a retarding vehicle. Efocaine can be injected either deeply subcutaneously or intramuscularly and it does not interfere with wound healing. It is of particular interest in rectal surgery.

EFOCAINE

Available in 15 ml. vials.

THE CROOKES LABORATORIES LIMITED · PARK ROYAL · LONDON N.W.10

In cases

of cough-disturbed sleep...

... Terpoin is a sure means of providing prompt and lasting relief. An invaluable measure for respiratory conditions involving excessive coughing, Terpoin Elixir has long enjoyed the esteem of the medical practitioner. Consisting of a balanced combination of proven medicaments presented in an agreeable syrup base, it is ideally acceptable and well tolerated by patients of all ages.

Literature and clinical sample, gladly on request

Contains per 100 parts:

Codeine Phosph. B.P.	0.366
Menthol. B.P.	0.366
Eucalyptol B.P.	0.083
Terpin. Hydr. B.P.C.	0.183

TERPOIN

ANTI-TUSSIVE ELIXIR

HOUGH, HOSEASON & CO. LTD., ATLAS LABORATORIES MANCHESTER, 19

'Zicthol', one of the new range of Genatosan Dermatological Preparations, has been shown to be exceptionally effective in the subacute dermatoses, especially in the subacute stage of the eczema-dermatitis group—the skin lesion most frequently seen by the practitioner.

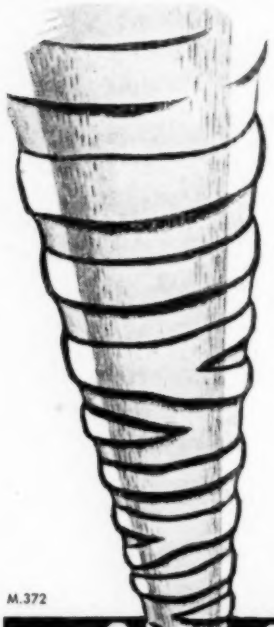
'Zicthol'*—exceptionally effective in the sub-acute stage of the **eczema-dermatitis** group of skin lesions

'Zicthol', which contains 16% Zinc Oxide, 4% Ichthammol and 2% Camphor in an oil-in-water emulsified base, is of paramount importance to the general practitioner and will enable the subacute dermatoses to be tackled safely, quickly and effectively. 'Zicthol' may be prescribed on form E.C.10 and is economical and very easy to use.

Literature and further information on 'Zicthol' and other new Genatosan Dermatological Preparations can be obtained from Genatosan Limited, Loughborough, Leicestershire.

*'Zicthol' is a Registered Trade Mark of Genatosan Limited

GENATOSAN LTD. *Loughborough, Leics.*



Relieving the bronchial tree in asthma

'ASMAC' Tablets are formularized to provide symptomatic relief of the bronchial tree both during actual dyspnoeic attacks of bronchial asthma, and during remissions.

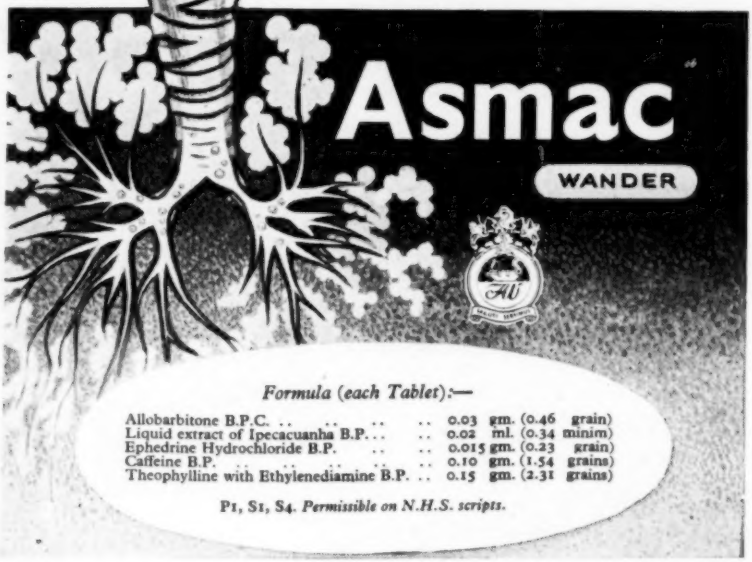
'Asmac' Tablets combine in a single prescription 'official' drugs recognized for their reliability to effect mental sedation, decongestion, expectoration and bronchodilatation.

PRESENTATION

Tubes of 20 Tablets (P.T. exempt for dispensing); Packs of 100, 500, and 1,000 for Hospitals.

A. WANDER LIMITED
42 Upper Grosvenor Street, Grosvenor Square, London W.1.

M.372



Formula (each Tablet):—

Allobarbitone B.P.C.	0.03 gm. (0.46 grain)
Liquid extract of Ipecacuanha B.P.	0.02 ml. (0.34 minim)
Ephedrine Hydrochloride B.P.	0.015 gm. (0.23 grain)
Caffeine B.P.	0.10 gm. (1.54 grains)
Theophylline with Ethylenediamine B.P.	0.15 gm. (2.31 grains)

P1, S1, S4. *Permissible on N.H.S. scripts.*

VIMALTOL

A QUALITY PRODUCT OF MODERN NUTRITIONAL SCIENCE

'VIMALTOL' is a concentrated vitamin food, formulated by and prepared under the control of the 'Ovaltine' Research Laboratories—which are actively investigating problems in nutrition and dietetics. They bring to its manufacture a high degree of scientific knowledge and a meticulous standard of hygiene.

'Vimaltol' contains malt extract, yeast, halibut liver oil and iron. Every ingredient used is rigidly tested for purity and quality, the final product being accurately standardized for vitamin content.

In addition to its vitamins, 'Vimaltol' provides valuable nutrients of undoubted assistance to infants, fast-growing children, nursing mothers and to those whose diet is inadequate or unbalanced. It helps to build up strength, weight and the natural powers of resistance. 'Vimaltol' is highly palatable—a decided advantage when recommending it for children.

A Product of the 'Ovaltine' Research Laboratories

M 376

Samples on physicians' request to Medical Department

A. WANDER LIMITED
42 Upper Grosvenor Street, Grosvenor Square, London, W.1.

Each ounce contains :—1,420 i.u. of Vitamin A, 710 i.u. of Vitamin D, 0.35 mg. of Vitamin B_1, 0.2 mg. of Vitamin B_2 (Riboflavin), 2.8 mg. of Niacin (P.P. Vitamin), 3.3 mg. of Iron—in a readily assimilable form.

Introducing

'VASYLOX'

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A New Nasal Decongestant

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THE PRACTITIONER

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THE MONTH

The Symposium

It has become a well-established tradition that the December symposium every year should be devoted to some aspect of disorders of the respiratory tract—and rightly so because coughs and colds, sneezes and snuffles, not to mention the more serious infections of the lungs, constitute the major problem in general practice at this time of the year. In 'the problem of the child with a chronic cough' and 'the case of the chronic asthmatic' Dr. Doyne Bell and Dr. Buzzard discuss in an essentially practical manner two aspects of the problem which are never satisfactorily described in the textbooks. Dr. Hunter's article on 'the prevention of respiratory infections in a closed community' will be appreciated particularly by those general practitioners who act as medical officers to schools and similar institutions. Bronchiectasis and emphysema are both conditions which tend to be overlooked during the winter when it is so easy to be satisfied by diagnosing the superadded bronchitis, forgetting to consider what can be done for the underlying lesion—even if only in the way of palliation. The introduction of the newer antibiotics, with their great practical advantage of being effective by oral administration, has given rise to undesirable confusion in the practitioner's mind as to their real value in the treatment of respiratory infections, as compared with penicillin. This is the problem which Dr. Anderson discusses in the opening article of the symposium. Finally, Dr. Cheney, of the University of California Student Health Service, demonstrates in a challenging manner how unjustified are many of the sweeping statements which clinicians make about the common cold.

Freedom of Prescribing

In his address at the opening of the 111th session of the University of London School of Pharmacy, Professor David Campbell, the President of the General Medical Council, had some pointed comments to make about what practitioners should be allowed to prescribe for National Health Service patients. According to the *Pharmaceutical Journal* (October 11, 1952, p. 261) he said that 'the danger now is excessive and inaccurate medication. And that danger is not lessened by persistent advertisement in the form of quasi-scientific and clinical dissertations which are showered so freely on the medical profession by various manufacturing drug firms, often of the same drug under half a dozen or so different proprietary names . . . It may be that the National Formulary and the deliberations of the Cohen Com-

mittee will help to solve the problem in this country. But I doubt it. Now that we are to have a quinquennial publication of the British Pharmacopœia with Addenda in the years between, I suggest that it is worth considering whether, save for experimental purposes, prescribing in the National Health Service should be confined to drugs and preparations made official in the Pharmacopœia. Such a policy in my view would lead to no loss of efficiency—in fact, it would improve it. And it would be less expensive to the community'.

We are not concerned here with the charge of 'inaccurate medication', but with the means suggested for preventing 'excessive medication'. That the national drug bill has been excessive since the introduction of the National Health Service, no one can deny. To allocate responsibility is more difficult, but practitioners, patients and the drug industry must share the responsibility among themselves—in what proportion it would be difficult to say on the evidence available. To suggest a remedy is more difficult still. Professor Campbell's remedy has the advantage of simplicity, but would it be to the benefit of the community? In these days of rapid, and occasionally dramatic, advances in therapy, is the public to be deprived of a new remedy simply because there has not been time for the *British Pharmacopœia* Commission to publish a monograph on it? Action is undoubtedly called for, but let it be permissive rather than mandatory. The remedy lies in the hands of the medical profession. If practitioners would prescribe only the minimum amount required and if, at the same time, they would prescribe efficient official preparations when such exist, rather than expensive proprietary preparations, then the problem would be well on the way to solution. At the same time the drug industry could make their contribution by ensuring that their products are available at the lowest possible price, and also by resisting the temptation to flood the market with old formulations under new and alluring titles. There is room for both official and private enterprise in the field of therapeutics. Indeed, it is only by full cooperation between them that the community can depend upon a continued advance in the conquest of disease.

W.M.A.

THE predominant memory of the Sixth General Assembly of the World Medical Association, which was held in Athens in October, is of the wonderful hospitality lavished upon the delegates by their Greek hosts. Delegates of twenty-three national medical organizations, including those of Germany, Japan and Yugoslavia, attended the meetings, which thus formed an excellent opportunity for mutual interchange of ideas and information. Indeed, these unofficial exchanges, as so often happens, were probably of more value than the meetings of the Assembly, which tended to be so formalized as to prevent the free exchange of ideas which is the only true basis for international cooperation. Of the value of such meetings there can be no question, but the time has probably

come for a careful review of the way in which the World Medical Association is developing. Two questions would seem to be apposite here. Is the real function of the Association tending to be overshadowed by undue emphasis upon status and organization? Is there a tendency for the Association to interest itself in matters which are already covered by other international organizations? There can be no doubt of the value of the interchange of information between national medical organizations throughout the world, but does this require the increasingly elaborate organizational structure which is being raised around the W.M.A.? Could not information concerning such matters as social security, national medical services, and professional ethics, be exchanged between nations in a more simple fashion than is now the case? Is not much of the information being sought already available in official documents? No one would question the necessity for a World Medical Association, and by bringing together, once a year, representative general practitioners from all its constituent organizations, it is serving a most useful function, but we are not convinced that the increasingly complex superstructure which it is developing is in the best interests of the general practitioners of the world.

Medical Treatment of Cataract

A RECENT report from New York suggests that the parenteral administration of an extract of fish lens protein may be of value in the treatment of cataract (Shropshire, R. F., *et al.*, *Science*, September 12, 1952, **116,** 276). The lenticular extract was prepared by comminution of the lens tissue, extraction with a physiologically compatible solvent, removal of insoluble residues, and sterilization of the final solution. The dosage was 1 ml. of this solution thrice weekly. It is stated that 'although several thousand injections of the fish lens extract have been administered, no allergic reactions have been observed'. The first group treated consisted of 14 patients, most of them aged sixty to seventy years, and most of them with 'typical senile opacities'. Several had cataracts associated with diabetes mellitus and/or hypertension. 'In all cases there has been a clearing of lens opacities', and 'in several cases who have had thirty injections, the progress has been from a completely incapacitated individual to one with practically normal visual acuity'. Details are given of a further twelve patients, aged thirty-four to seventy years, who have had twelve to forty injections. Initial and final visual acuities in this series show improvements from, for example, 20/60 to 20/15, 20/150-1 to 20/40-3, and 20/80 to 20/20-2. It is stated that two series of cases, one numbering 100 and the other 50, are being fully investigated and will be reported upon in due course. This preliminary report will arouse widespread interest, but obviously judgment must be reserved until fuller details are available and until workers elsewhere have had the opportunity of confirming, or otherwise, the findings. Apart from anything else standardization of the method of preparing the fish lens ex-

tract may prove difficult. No information is given as to the duration of the improvement in patients, but it is stated that 'in a large series of experimental animals, controlled induced cataracts were caused to regress to disappearance by the parenteral administration of fish lens protein extracts. Such cataracts could not again be reinduced experimentally with the original stress if, concurrently, fish lens protein extracts continued to be administered'. In spite of the many improvements in the surgical treatment of cataract during recent years, there would obviously be many advantages in a non-surgical method of treatment, even if it could be used only in those patients for whom surgical treatment still constitutes a definite risk.

A Pharmacist Looks Back

THE centenary celebrations of The Hospital for Sick Children, Great Ormond Street, London, has prompted Mr. J. Wicliffe Peck, who was appointed assistant dispenser to the Hospital in 1896, and chief dispenser in 1898, to recall some memories of his early days there (*The Chemist and Druggist*, October 18, 1952, p. 542). In 1896 the sole manufacturing plant in the dispensary consisted of one kettle, one saucepan, one gas-ring, a large and a small mortar, with two glass ones, a tincture press and twenty 3-gallon earth jars. 'Grosses of powders were made every day' and he bought 'thousands of grey powders, and grey powders with rhubarb of many sizes. Most of the patients at one time took away twenty-four, thirty-six or forty-eight powders'. Compound syrup of iron phosphate was made in 20-gallon lots, and syrup of iron iodide in 2-gallon quantities. In those days '5 to 7 minims of alcohol was a wonderful stimulant, and no doubt saved many lives, but 30 to 90 minims of tinct. belladonnæ, t.d.s., for enuresis in a small child, gave me some anxious moments'! Liquid paraffin started its career at Great Ormond Street under the influence of Arbuthnot Lane, and soon, in association with several other hospitals, Mr. Peck was buying over 6000 gallons a year. Pharmacists in those days had a versatility of work which must seem strange to the modern generation. In 1901, Mr. Peck was appointed assistant bacteriologist to the Hospital, and during the five years he held this appointment he 'made over a thousand complete examinations for diphtheria alone'. Nor was bacteriology then the refined science it has become today: 'I visited the slaughterhouse and held my glass jar under the dying sheep for blood to make blood serum'. He was also the biochemist to the Hospital: 'I did all the analytical work, including work on the daily milk supply, and as time went on was drawn into many investigations into cerebro-spinal fluids, etc.'. As if this were not sufficient variety, he also started the x-ray department in one of the dark storerooms 'with a large accumulator, a 15-in. coil, and some unknown, untested x-ray tubes'. If variety really is the spice of life, then a pharmacist at the turn of the century must have led a wonderfully rich life. We wonder whether his more specialized successor of today is as happy in his work?

THE NEWER ANTIBIOTICS IN RESPIRATORY INFECTIONS

By THOMAS ANDERSON, M.D., F.R.C.P.Ed., F.R.F.P.S.

Reader in Infectious Diseases, University of Glasgow; Physician, Knightswood and Ruchill Fever Hospitals; Regional Consultant, Western Regional Board, Scotland.

A WIDE choice makes decision difficult. In the last few years the number of therapeutic agents of proven antibacterial efficiency has increased from one to half-a-dozen; and since each new substance has tended to enlarge the field of chemotherapy, it might seem simplest to assume that the latest is necessarily the most effective. But cost alone is a sufficient reason for suggesting that there is still room for a more thoughtful approach, particularly perhaps in respiratory infections. For the number of organisms responsible for such infections is not great and, with a few exceptions, they are not characterized by any marked resistance to chemotherapeutic action. Therefore as a general introductory statement it may be said that there is no ground for the view that any particular antibiotic is the 'best'.

When the patient is suffering from an infection due to an organism susceptible to a certain antibiotic, is chemotherapy always to be regarded as essential? To answer such a question some knowledge of the natural behaviour of the infection is necessary. When, as for example in meningococcal meningitis, all our information shows that, untreated, the infection can pursue a lethal course in a high proportion of cases, the answer is simple. At the opposite extreme, however, there are many infections in which the course is short and invariably benign. To administer chemotherapy as a routine in infections of this character seems, at the least, unnecessary. The point might indeed be made that the time has been reached when we should avoid the administration of chemical agents whenever it is possible to do so with safety. Not only have bacteria quickly acquired the capacity to resist the action of antibiotics, but the host himself may easily acquire a sensitivity to them. Generalized sensitization reactions are undoubtedly more commonly encountered today than in the past, and there can be no doubt that the indiscriminate administration of chemotherapeutic agents is an important contributory factor. When the results of carefully conducted inquiries fail to demonstrate convincing evidence of beneficial action, antibiotics should not be used. In many infections their administration should be reserved for the occasional severe case.

INFECTIONS OF THE UPPER RESPIRATORY TRACT

The 'acute sore throat' is one of the most common conditions seen in practice. There can be no doubt that several of the preconceived ideas regarding the acute throat require correction. First, it is interesting to comment

on the virtual disappearance of diphtheria. During a twelve-month observation period of all the cases of acute throats occurring in the practices of four general practitioners in the City of Glasgow, not a single case of diphtheria was encountered. Secondly, it is often thought that the most usual cause of acute tonsillo-pharyngitis is the hæmolytic streptococcus, but, in fact, only one-third to one-half of the cases can reasonably be ascribed to this organism. In a high proportion of the remainder no bacterial pathogen can be isolated and it seems possible that a virus infection is responsible. Despite the impression to the contrary, the correct diagnosis of the streptococcal case, on clinical evidence alone, can be very difficult. Thirdly, the great majority of cases of sore throat recover rapidly from the infection in twenty-four to forty-eight hours without any complications. In these circumstances, the routine administration of penicillin is unjustifiable. It should be given only when the clinical signs—high temperature, faucial and palatal œdema, tonsillar exudate and glandular enlargement—indicate a virulent infection. There is now a considerable body of unbiased evidence that the sulphonamides are ineffective in this condition.

The presence of a generalized punctate erythema merely confirms a streptococcal etiology, indicates a patient who is susceptible to the rash-producing toxin, and changes the name from tonsillitis to scarlet fever. The reasons for administering an antibiotic are not changed. No doubt, in hospital practice there may be wisdom in giving antibiotics more frequently —even perhaps to every case—in order to produce a more rapid disappearance of the infecting organism and in this way to reduce the chances of ward cross-infection. When treated at home, such special precautions will often be unnecessary—as indeed are all the old-fashioned elaborate isolation procedures—and the patient will recover quickly without assistance.

Although not strictly a respiratory infection, the close association of inflammation of the middle ear with the throat justifies its mention here. The spread of infection to the middle ear is an absolute indication for an antibiotic. Attempts to clear the condition with sulphonamides waste valuable time. Complete cure with healing of the drum head (should otorrhœa have developed) may confidently be expected after five to seven days of efficient antibiotic therapy.

For these cases, penicillin is the treatment of first choice. My own preference is for an aqueous form of penicillin in a dosage of 250,000 to 500,000 units six-hourly. After the first twenty-four to forty-eight hours the timing may be altered to once or twice a day with an appropriate increase in the dose. It is generally advisable to continue treatment for seven days even when clinical improvement is already apparent. In cases of otorrhœa, if there is not obvious amelioration within forty-eight hours, a swab should be submitted for bacteriological examination, with a request for sensitivity tests against a variety of antibiotics. Good results have been obtained with chloramphenicol or aureomycin when an organism is isolated which is resistant to penicillin. Such cases are less common in general practice than

in hospital. In the first year of life, the possibility of a coliform infection should be remembered.

THE LARYNX AND TRACHEA

Acute laryngo-tracheo-bronchitis.—In recent years, this infection has begun to acquire even a greater dread than used to be attached to laryngeal diphtheria; for, whereas the latter usually responded to intubation or tracheotomy, these operations are often quite ineffective in the former. Whether the condition is primarily of virus or bacterial origin is still undecided; but in some cases the weight of evidence would support a virus etiology. Nevertheless, by the time the patient is seen there is no doubt that a bacterial infection constitutes an important aspect of the infection.

In a large proportion of these cases the infecting agent is *Staph. aureus*, and—of even greater importance—in many of them this organism is resistant to penicillin. Penicillin should therefore never be the treatment of first choice. Chloramphenicol or aureomycin therapy is indicated. A full course of treatment should be pursued for seven days, even when early clinical improvement seems obvious. A disturbing feature of this infection is that sudden reappearance of obstructive signs can arise even after two to three days of seeming well-being.

Although acute laryngo-tracheo-bronchitis may be encountered in all age-groups, it is more common and of graver significance in children. In adults an acute laryngitis or tracheitis can be a disturbing and painful consequence of virus influenza. Superimposed bacterial infection is usually present, and chloramphenicol, aureomycin or terramycin prove beneficial.

BRONCHITIS

Acute bronchitis presents itself as a problem at two periods of life: namely, in those under five years of age, and in the elderly. In the younger age-group the distinction between bronchitis and broncho-pneumonia is one which should not demand an effort of diagnostic skill, for it is best to diagnose the more serious condition. Since the infecting agent is in the bronchi, and thus more or less 'outside' the body, it may be unwise to depend altogether upon the sulphonamides, especially in infancy, and penicillin is desirable, at least in the early stages of treatment. A single daily injection will often suffice, and after two to three days, treatment may be continued for a further period with sulphadimidine.

In the older age-groups, three points should be borne in mind. First, in the majority of cases the condition is superimposed on a pre-existing chronic bronchitis; secondly, the diminution of respiratory function already produced by ageing may make the illness much more hazardous; and, thirdly, delay in coping with the infective aspect of the condition may encourage the development of broncho-pneumonia. In treating such cases in the elderly, it may be difficult to produce adequate levels of antibiotic in the lungs and, in order to overcome this, the ethyl ester of penicillin ('estopen') may be used: a dose of 500,000 units every twelve hours.

The wayward course of bronchitis in the elderly should not occasion surprise. To begin with, the infection is less often a 'pure' one than in the younger person, and culture of the sputum may produce a mixed flora of potential pathogens such as hæmolytic streptococci, pneumococci (often type 3), Friedländer's bacillus, or *H. influenzæ*. There will be occasional cases in which obvious lack of improvement in twenty-four to forty-eight hours may indicate a need for an antibiotic of wider antibacterial range, and chloramphenicol, aureomycin or terramycin may be tried. They should not, however, be the first line of defence. In regard to the general management of these cases, two points may be made. First, the temperature is not the best criterion of clinical improvement, for in older persons once fever has been present the temperature may fluctuate for some days. The sputum is a better guide, and a daily specimen should be seen, preferably expectorated at the time of the visit. The replacement of the purulent, almost nummular spit by a more mucoid specimen is a valuable indication of improvement. Secondly, it is hardly necessary to emphasize that the period of bed-rest should not be prolonged. Provided there is no serious cardiovascular disturbance, early ambulation is important: it increases the depth of respiration, enhances the capacity to cough and so to clear the respiratory passages and, in most cases, produces a marked mental stimulation of the patient.

Enough is not known of the course of *chronic bronchitis* to permit of dogmatism in regard to its treatment. It is doubtful, however, if infection is an aspect of the condition of primary importance—apart from the acute exacerbations common in the winter, which have, of course, an infective basis. The prolonged administration of antibiotics to such patients is undesirable, whether by mouth, by injection or by inhalation. In chronic bronchitis, the 'soil'—the abnormal respiratory mucosa—seems one which almost encourages bacterial growth. By administering antibiotics we may, for a short period, sterilize the soil, but its repopulation with a new flora is almost invariable and the immigrants may not always be harmless. In these circumstances, it is preferable to reserve our potent therapies for the periods of exacerbation.

PNEUMONIA

What is the best antibiotic for the treatment of pneumonia? Such a simple question seems to imply the suspension of all clinical judgment. The term pneumonia when thus used seems to indicate some single disease-concept, something unaffected by such conditions as the previous history of the patient, the age, the type of infecting agent and the extent of the infection. One would not imply that it is impossible to set down certain sound general principles for the treatment of pneumonia. It is suggested, however, that there is still a place for clinical judgment—that indeed the 'best' treatment demands not only the efficient administration of some form of chemotherapy but the display by the practitioner of an appreciation of the different prognostic factors involved. 'Pray, sir, may I ask what you mix your colours with?', said a brisk dilettante student to the great painter; 'With brains,

sir', was the gruff reply. So recounts Dr. John Brown in his 'Horæ Subsecivæ', and the analogy with much of chemotherapy is apt.

Perhaps the best single prognostic factor in pneumonia is the most easily elicited, namely, the age of the patient. The importance of age as a factor is shown by the following figures. During 1951, 2,051 cases of pneumonia were treated in the Glasgow Infectious Diseases Hospitals. All but 21 of the 154 deaths were under the age of one year or over the age of forty-five years. Between the ages of five and forty-five years, 686 patients were treated, with 10 deaths; a fatality rate of just over one per cent.

Between the ages of five and forty years few problems will therefore arise. A single injection of 500,000 units of penicillin followed by standard sulphonamide therapy for five days will suffice. In childhood the period of greatest danger is under two years. The infecting agent most to be feared at this age is *Staph. aureus*. In these cases, the consolidation is usually extensive, the child is pallid, toxic and dyspnœic and there is little doubt of the urgent need for energetic treatment. When these cases arise in domestic practice it may be assumed that the organism is sensitive to penicillin; but if there has been any contact with hospital or hospital out-patient departments, a resistant organism should be expected. In my own experience, penicillin in high dosage (250,000 units four-hourly) has proved adequate for this form of infection, but with the increasing frequency of penicillin-resistant staphylococci the practitioner may feel safer in using chloramphenicol, aureomycin or terramycin, resistance to which is as yet not often encountered. Chloramphenicol palmitate may be useful in overcoming the difficulty of administration at this age. A final feature of the staphylococcal case may be mentioned, namely, the frequency of empyema —often with pneumothorax. There should be no hesitation in aspirating such cases if clinical improvement is not obvious within two to three days.

All cases of pneumonia under two years, however, are not staphylococcal; indeed these still represent less than 5 per cent. of all cases in this age-group. When the clinical findings are not in keeping with such a diagnosis, penicillin will prove adequate. It may with advantage be given orally to the milder cases in this age-group, but oral administration should never be relied upon when the clinical picture suggests a severe infection.

Patients over the age of forty years should always be regarded as an urgent therapeutic problem. In Glasgow—with its heavy industries and uncertain climate—the majority of patients in this age-group present with a widespread bronchitis and it may prove difficult to elicit the classical signs of consolidation. Treatment should not await demonstration of these signs, but should depend upon the history of the illness (occurrence of rigors, presence of chest pain) and the degree of cyanosis and dyspnœa. Penicillin should again be advised as the treatment of first choice. Starting with a dose of 250,000 units intramuscularly, treatment should be rigorous in the first twenty-four hours, preferably with dosages of 100,000 to 250,000 units at four-hourly intervals. Subsequent therapy may be assessed on the improve-

ment seen during this early period; once the temperature has subsided a single daily injection often suffices. There is no support for the view that the newer antibiotics, chloramphenicol, aureomycin or terramycin, should be used as standard therapy. The Committee of the Medical Research Council which studied this point in a carefully controlled trial concluded that penicillin was as valuable as the other antibiotics used; and that drug-toxicity was more common with chloramphenicol and aureomycin.

Particularly during epidemics of virus influenza, may cases of *fulminating staphylococcal pneumonia* be encountered at any age. There is rarely any doubt of the severity of such infections. Deep cyanosis, restlessness, delirium, dyspnœa, and an obvious overwhelming toxæmia are usual. The mortality is high in this type of case, often because the extent of staphylococcal infection in the lungs is beyond control. That death occurs despite penicillin is no criticism of the antibiotic, and there is no evidence that better results accrue from the use of the newer antibiotics. Faced with such a patient, however, the physician may be excused if he administers a variety of agents. I prefer penicillin in doses of 500,000 units two hourly. Such an obvious measure as continuous oxygen therapy must not be omitted.

And what, it may be asked, about *virus pneumonia*? Have not the newer antibiotics been shown to be effective in 'primary atypical pneumonia'? In answering such questions we enter the field of controversy. In my own opinion, supported by observations of the endemic pneumonia in Glasgow over several years, 'virus' pneumonia or 'primary atypical pneumonia' must be an unusual occurrence in ordinary domestic practice. It may be argued that in all pneumonias the initiating infection is produced by viruses —of which only the influenza viruses are capable of proof. Even in virus influenza pneumonia, however, by the time the patient is seen by the doctor it may safely be assumed that it is a bacterial infection which dominates the picture. The concept which has been created in recent years, that bacterial pneumonias are always 'typical', is not a correct one. Failure to respond to adequate chemotherapy is not a reason for the diagnosis of a 'virus' pneumonia but for a review of the patient in every aspect, both clinical and bacteriological. Such a careful review will often unmask forms of infection for which chloramphenicol, aureomycin or terramycin will be an improvement on penicillin: but they will constitute a small proportion of the cases.

WHOOPING-COUGH

Neither penicillin nor streptomycin has proved of specific value in the treatment of whooping-cough. Both chloramphenicol and aureomycin, however, act beneficially, not only in reducing the number of paroxysms, but in mitigating their severity. Treatment should be begun at an early stage of the disease, however, in order to secure maximum benefit. Once the actual 'whooping' stage has been reached the effects of the antibiotics are less striking.

CONCLUSIONS

The viewpoint presented will seem perhaps unduly insular and conservative. But it is worth stating with some firmness that, within its obvious bacterial limitations, we possess in penicillin a first-class antibiotic, which is effective against the majority of respiratory infections; a substance, further, which perhaps because of its limited antibacterial range produces less upset of the host's normal microbial flora. The effect of the newer materials in producing an almost total temporary bacterial sterilization of the host must be borne in mind. The repopulation of the respiratory tract and bowel by fungi is a frequent occurrence. That such changes have so far not proved fatal in more than a handful of patients is beside the point. The irritating perianal and perivaginal pruritus may be more disturbing to the patient than his original illness. My own experience is that the appearance of fungi is rather more frequent in those over the age of forty years—perhaps because of the frequency of unsuspected chronic bronchial mucosal changes. Perhaps for this reason especial care should be exercised in the treatment of the elderly patient with chloramphenicol or aureomycin. Prolonged or repeated courses of treatment with chloramphenicol have given rise to fatal forms of aplastic anæmia; and although such catastrophes have occurred in a very small proportion of those given the drug, they must serve to emphasize the need for caution. No doubt greater experience of the use of the newer antibiotics under conditions which permit of careful study and control will result in the discovery of methods to circumvent their side-effects. In the present stage of knowledge they should always be used thoughtfully and with a definite end in view. Those studies which have been made under adequately controlled conditions have not supported a belief that penicillin has been superseded as the most effective form of treatment in pneumonia.

With regard to the methods of administration of penicillin, certain general statements may be put forward. The single daily injection will prove adequate for many cases, particularly in those age-groups in which the prognosis is now good. When the infection is severe, it is safer to rely on the aqueous solution given more frequently. It should be repeated that over the age of forty to forty-five years the diagnosis of pneumonia warrants urgent action for at least twenty-four hours. The question of administrative convenience should not arise. The need is to achieve, locally in the lungs, high tissue concentration of penicillin, and this may be most successfully attained by frequent administration, intramuscularly, of an aqueous solution. Oral penicillin cannot be recommended as a routine measure except as a means of continuing treatment after the worst of the infection has been quelled by the earlier use of penicillin intramuscularly. In deciding upon dosage and route of administration the nature of the pathological process produced by the infecting agent must be constantly in mind. In controlling the pathogen, what finally matters is not the achievement of a certain concentration in the blood, but the attainment of an adequate and effective amount locally, at the site of the infection.

THE CARE OF THE CHRONIC ASTHMATIC

By E. M. BUZZARD, B.M., F.R.C.P.
Physician, United Oxford Hospitals.

THE chronic asthmatic presents one of those problems which is a nightmare to practitioner and patient alike; not just a mythical potentiality, but a realistic bad dream which haunts the hours of darkness between midnight and dawn, when the patient's morale is at its lowest and the doctor's patience and sympathy are put to their greatest test.

NATURAL HISTORY

In order to manage the chronic asthmatic with any degree of success, it is essential to understand the natural history of the asthmatic condition from beginning to end; from the time when the asthma is occasional only, to the time when respiratory disability of variable extent is permanent, punctuated by recurring and all too frequent episodes of bronchial spasm. At this stage one fundamental fact must be recognized—that every occasional asthmatic is a potential chronic asthmatic, and that a patient tends to grow into, rather than out of, his asthma unless steps are taken to halt or slow up the sequence of events which leads to chronic disability of a most distressing kind.

It cannot be too strongly emphasized that by the time a patient becomes a chronic asthmatic many factors are inevitably operating, even though there may well have been only one etiological agent when he first began to wheeze. That is why a single line of treatment, be it desensitizing injections, vaccine therapy, antispasmodic drugs or psychotherapy, all too often advocated by the enthusiast, is bound to fail in the vast majority of long-standing asthmatics. That does not mean that there may not be an outstanding etiological factor which it is essential to recognize, but it must not be treated to the exclusion of other factors which are surely present. The train of events which takes place over many years in a patient with a hypersensitive respiratory tract may be summarized as follows.

A.B. comes from an allergic family: his father suffers from asthma and one of his sisters has hay fever. As a child and young man he used to get true pollen hay fever in June and July each year. The rest of the year he was perfectly fit. Then at the age of nineteen he began to get bronchial spasm at the time of his hay fever, even though this latter was becoming less severe. For a few years this asthma was strictly seasonal until one January he developed a severe upper respiratory tract infection which 'went to his chest'. Similar winter episodes became more frequent and each was complicated by asthma in varying degree. His nose became stuffy all the year round, and examination of it showed nasal polypi with hazy x-ray changes in the maxillary antra. The polypi were removed on more than one occasion; pus was found locked up behind them, and muco-pus was washed out of one antrum. By this time he was getting asthma almost every night at three a.m., was finding it more and more difficult to get to work in the mornings, and was becoming dispirited and irritable. He found that whereas previously he had been able to take exercise between attacks, now he was becoming limited in his ordinary activities by dyspnœa. Then one March he contracted epidemic influenza, complicated by

a severe respiratory infection with purulent sputum. Thereafter he coughed up muco-purulent sputum every morning and coarse râles were persistently present at the base of one lung. Penicillin reduced this sputum in amount and a periodic injection of adrenaline from his doctor relieved his more severe attacks of asthma, but neither produced any permanent benefit and he relied more and more on the use of a proprietary inhaler. Confidence in his doctor began to wane and he felt that no one had the time to help him or, indeed, could help him, and over it all hung the spectre of the severe attack which sooner or later would not respond to adrenaline.

Once that young man's asthma developed in the winter as well as in the summer he became a potential chronic asthmatic. It will be seen that between the ages of fifteen and forty-five the following factors in varying degree, at first singly and later in combination, played a part in converting a fit young lad into a respiratory cripple: pollen sensitivity, mechanical nasal obstruction, secondary antral infection, secondary bronchitis, emphysema and bronchiectasis, and last, but by no means least, a psychological factor associated with lack of confidence in himself, lack of confidence in the medical profession and, later, despair occasioned by the apparent inability of anyone to help him. Thus, no fewer than seven factors contributed to his disability, a number which will be increased to eight if we follow him through to the pulmonary heart failure which would be his lot by the time he reached fifty years of age.

Not every chronic asthmatic, of course, goes through all these stages, but there must be few who do not have three or more of the above factors operating, of which infection and the psychological state are probably the most important, as being constantly present.

In many chronic cases, in fact in the majority, the allergic state traceable to one allergen does not exist, and the pollen or cat asthmatic is a comparative rarity. When it does occur it can usually be combated effectively by avoiding exposure or by desensitization. The presence of such allergens and their true place in the etiological team can usually be deduced by taking a careful history, particularly with regard to the circumstances of the earliest attacks; preferably the first spasmodic episode of all. Skin tests should be used to confirm, when possible, the clinical impression, and on occasion to pin-point one particular offender in a group of possible allergens, usually inhalants. Nothing but harm and disillusionment can come to the patient if routine skin tests are done and he be desensitized against those substances which produce, often as a result of considerable superficial skin trauma, so-called positive wheals. It must also be recognized that such substances as dust, fog, boiler fumes and tobacco smoke—the inevitable accompaniments of everyday life today—will irritate the respiratory passages of any asthmatic and make him cough and wheeze. House dust undoubtedly acts as a specific allergen on occasions, in which case samples of dust from the patient's bedroom should be used in a specific skin-testing solution and desensitization carried out if a positive reaction is obtained.

More often the story is one of intermittent attacks of spasm, sometimes starting in childhood following whooping-cough or measles. The patient

may have little idea of the cause of his spasm except that upper respiratory tract infections aggravate it, as do worry, tiredness and exertion. He is usually quite baffled by its persistent recurrence in the early hours of the morning. It is in these cases, and they are common enough, that the general principles of management now to be discussed apply most strongly.

It will be seen from the foregoing generalizations that every chronic asthmatic is a problem in himself, with many factors requiring investigation and treatment. The etiological factors and natural history of the condition have been dwelt on at some length because they should form the basis of the balanced and reasoned long-term management of a condition for which unbalanced and unreasoned treatment is so often advocated.

PRINCIPLES OF CARE

The general principles of care must be based on the natural history of the condition as outlined above. The first and most important principle is that the patient's confidence must be gained—confidence in his doctor and confidence in himself and his ability to overcome his disability. In this way his morale must be raised to a high level and kept there; no easy matter in such a fickle condition as asthma, but one which pays enormous dividends if and when attained. There can be only one person, in my opinion, who can do this and who can sustain it throughout the years. That person is the general practitioner in charge of the case. He is the only person with an intimate knowledge of the patient's background, his parents and siblings, and their relationship to the patient; with knowledge of his wife or his girl friend; with insight into his fears and anxieties, his pleasures and hobbies; with an appreciation of his financial affairs and social position; and, most important of all, he alone can appreciate changes in the patient's condition which may require week to week alterations in his management. I have so often noticed that the patients who fail to respond to sensible management after a fair trial do so, not because the wrong drugs are being prescribed or because a particular line of treatment has been overlooked, but because the patient's home is an unsatisfactory one—it may be the patient's fault or his near relatives' fault, but it is usually clear if one can see him at unexpected times in his home surroundings. The same thing may apply to his working conditions.

The consultant may be able to help in the treatment of one particular factor which may be outside the practitioner's scope, but how can he know the whole picture? Patients tend to be on their best behaviour and dressed in their best clothes when they come to the hospital out-patient department —artificialities which may cloak their real characteristics. I purposely stress the importance of the practitioner's place in the management of these patients because in many, if not in most, practices of today the chronic asthmatic is, of necessity, regarded as a nuisance. The bottle of medicine or injection of adrenaline cannot be of anything but the most short-term value unless it be combined with a long-term understanding of all sides of the

patient's dilemma; and the secret of any success is the time factor. Given time, the study of the chronic asthmatic can be a fascinating one, but in the hurly-burly of the present-day surgery or out-patient department the necessary time is difficult or impossible to find, and the asthmatic is one of the first to suffer. If, however, time were spent when the patient first comes under observation, the nuisance of the emergency night call would automatically diminish.

The second important principle is that the treatment prescribed must be simple and practicable. Any treatment which requires the actual presence of the doctor, except in an emergency, or which necessitates frequent attendance at hospital or, worse still, admission to hospital, must be deemed to have failed before it starts. Asthma, like epilepsy, duodenal ulcer or spastic colon is a recurring condition, and the tendency to bronchial spasm remains with a patient for his lifetime. Therefore there must be a long-term scheme of treatment which must go on for months and years, not just when he has his symptoms, but also in the free intervals, and it must not be abandoned as soon as he gets his first good night's rest.

DETAILS OF CARE

Breathing exercises.—All chronic asthmatics benefit from properly taught breathing exercises along the lines laid down by the Asthma Research Council. These are designed to encourage fuller expiration by the conscious use of the diaphragm and of the rectus abdominis muscles. In cases in which secondary infection is prominent, basal expansion is also taught with, if necessary, postural drainage as well. Recently the art of muscle relaxation by posture has been advocated by Hans Heckscher, of Copenhagen, and this undoubtedly is of value. Breathing exercises have not only a mechanical value but also a marked psychological effect: 'Here, at last', says the patient to himself, 'is something that I can do and which I realize will assist my distressed breathing'. I have seen asthmatics converted from the chronic group to the occasional group by the intelligent application of such exercises, with virtually no other treatment. A cheerful and optimistic outlook on the part of the masseuse, coupled with a pleasant and forceful personality, is an essential corollary to the exercises.

Drug treatment.—There are constant features of bronchial spasm and its secondary complications which can be materially assisted by judicious use of drugs. The use of antispasmodic drugs, expectorants and sedative linctuses should be considered together. Every doctor has his own favourites but they should be simple and cheap, and free from habit-forming tendencies or unpleasant side-effects. More important than the individual prescription is the necessity for impressing on the patient that he must have a medicinal routine, the details of which may require juggling with to suit individuals, and that, once decided on, the routine should be continued for weeks or months or even years, perhaps in gradually decreasing dosage, regardless of whether or not the patient has symptoms.

I use a simple alkaline expectorant like compound mixture of sodium chloride (B.P.C.) in combination with a sedative linctus, such as opiate linctus of squill (B.P.C.), together with one of the antispasmodic drugs, such as 'monotheamin' or 'neoepinine', or ephedrine or aminophylline. Mixture of stramonium and potassium iodide (B.P.C.) is another useful antispasmodic expectorant, but symptoms of stramonium overdosage sometimes result if the mixture is taken for too long or at too frequent intervals. All asthmatics are assisted by free expectoration, so as to clear the bronchioles early in the morning, and a dose of the alkaline mixture taken in hot water and washed down by an early morning cup of tea is an excellent expectorant, to be followed by the morning breathing exercises. This routine can be repeated at midday and in the evening, at which times an antispasmodic can be taken as well. The nights are the most difficult for patient and doctor alike. The sedative linctus, 60 minims (3.6 ml.), with phenobarbitone, ½ grain (32 mg.) or 1 grain (65 mg.), should be taken last thing at night with an antispasmodic if necessary, and a further dose of linctus should be left by the bedside and taken if the patient wakes coughing, as he so often does; in this way the consequent wheezing can often be prevented.

Sedative drugs are a problem: these patients need sleep; on the other hand it is dangerous to depress the respirations too much if the patient is actually wheezing, and if there is a great deal of bronchial spasm fatalities can and do occur. Chloral hydrate, in a dose of 30 grains (1.9 g.), is an excellent hypnotic and can be repeated in half the dose later in the night if necessary. Morphine derivatives should never be used, not only because of the dangers of drug addiction, but also because sudden death is a not uncommon sequel to their use. Pethidine is the least dangerous and has a useful antispasmodic action, but is one of the most habit-forming and is therefore best avoided except in critical circumstances.

The patient should keep a small stock of his routine medicines in the house, and at the first sign of persistent spasm, as occasioned by an infection for instance, he should take the drugs four-hourly for twenty-four or thirty-six hours, then six-hourly, and later eight-hourly. He must do this on his own responsibility without necessarily referring to his doctor, and certainly without having to obtain prescriptions and have medicines made up, by which time the bronchial spasm is so often obstinate; the object being to bring the attack under control at the very first sign of trouble.

In severe asthmatics, particularly in the early days of treatment and in specially aggravating circumstances, the patient should give himself 5 or 7 minims (0.3 or 0.4 ml.) of adrenaline by injection, and this should be repeated two hours later and perhaps four-hourly for a few doses. The single injection of adrenaline is often effective for a very short period only and it must always be repeated in order to prevent the return of troublesome spasm. If the patient in this way is able to treat himself he will gain confidence in his own ability to abort the attacks.

Almost all chronic asthmatics use a proprietary inhaler, and there is no

doubt of its value. Its use should not be forbidden, but it should be used as an antispasmodic in the above scheme and its use thus limited to some extent. If the patient's symptoms improve after a few weeks or months, as one hopes, then he will automatically be weaned from his inhaler as the demand for its use becomes less and less. Most of the proprietary inhalers contain adrenaline among other drugs, and I have found the inhaler addict to be very resistant to parenteral adrenaline should the need for the latter arise—a matter of some importance in the treatment of the more severe episodes of spasm.

STATUS ASTHMATICUS

I do not propose to go into the treatment of status asthmaticus in any detail, except to emphasize a few points. Intravenous aminophylline, 0.25 g., or the full dose of 0.5 g., in 20 ml., given slowly, is by far the most effective routine drug for breaking the vicious circle, especially when adrenaline has already been used in considerable amounts, as it so often will have been. Once some temporary relief has been obtained, then a two or four-hourly routine as already outlined should be followed. There must not be too long delay in sending a case of status asthmaticus into hospital, because it can be a fatal condition despite what the textbooks say. ACTH, now available in hospital centres for short-term emergency treatment, is a very effective immediate remedy and may be life-saving. The warning about morphine derivatives already given applies even more to its use in status asthmaticus. Intramuscular paraldehyde, in a dose of 4 ml., is a useful sedative at a time when sleep is needed but when respirations must not be unduly depressed.

INFECTION

The part played by infection in the chronic asthmatic state is an important one and can be considered under three headings. First, there is some evidence that bronchial asthma appearing for the first time in middle-aged or elderly patients may be due to bacterial allergy, and if so, it is best combated by giving an autogenous vaccine, but the isolation of the organism and the preparation of the vaccine is a somewhat specialized procedure if the best results are to be obtained. Secondly, an upper or lower respiratory tract infection will often precipitate a bout of asthma, and this latter can often be aborted by the energetic and early use of antibiotics, particularly penicillin. Thirdly, bronchial spasm lasting for more than a few hours commonly leads to infection in the distal pulmonary segments, and it is this secondary infection which may cause the spasm to persist long after the original causative agent has ceased to function. Therefore antibiotic treatment is a valuable remedy in the later as well as in the early stages of an asthmatic attack, and obstinate spasm will often clear up rapidly in this way. A word of warning should be given about the use of chloramphenicol, which is an effective and easily administered antibiotic for cleansing sputum. Just as its repeated use in recurrent urinary infection has led on occasions to a

dangerous blood dyscrasia, so its repeated use in infective asthma must carry a similar risk.

The upper respiratory tract has to be considered as a source of infection, and the washing out of pus from an antrum can produce a dramatic alleviation of spasm; it must be remembered that children are by no means immune from antral infection. In the absence of frank pus, however, operations on the nose and sinuses should be viewed with caution, and the x-ray haziness of antra more often indicates chronic mucosal congestion and œdema than active infection, and is best treated conservatively.

Allergic symptoms in the upper repiratory tract can often be relieved by the use of antihistamine drugs, administered either locally or by mouth, but in my experience they have comparatively little effect on actual bronchial spasm other than by the soporific effect which they so often induce.

GENERAL REMARKS ON CARE

The majority of chronic asthmatics are young and middle-aged adults to whom all this advice largely applies. It is necessary to consider patients in the younger and older age-groups.

Children are often victims of asthma from an early age and the condition may become chronic before puberty. There is usually a strong allergic family history and the child is often an only one. True allergic factors should be sought for and eliminated, provided that it is certain that they are responsible for the symptoms. This proviso is doubly important with children because unnecessary desensitizing injections can do much physical and mental harm. Similarly, the unnecessary withdrawal of some nourishing foodstuff or enjoyable sweetmeat from the diet will also do harm. The relationship between child and parent or sibling is likely to be a much more important factor. It is astonishing how quickly the child with an asthmatic tendency will react subconsciously to some discordant situation in his home life—a situation which may be entirely hidden from the conscious mind of both patient and parent, but which will usually be obvious enough to an onlooker who knows the family. The family doctor has obvious advantages over anyone else in this respect. A friendly word of advice to the parents is so often the best form of treatment. Sometimes the child is better removed from an unfavourable home atmosphere by sending him away to boarding school. The well-recognized week-end asthma of children attending day school is an example of the effect of such a home atmosphere.

Opiate linctus of squill (B.P.C.), in 60-minim (3.6 ml.) dosage, is a most useful nightly sedative for children, combined with 'monotheamin' or ephedrine, and with phenobarbitone, $\frac{1}{4}$ grain (16 mg.), often ensures a good night's rest. Care must be taken that the nightly sedative, though accomplishing its purpose in subduing the early morning spasm, does not dull the child's wits in morning school. I have known a schoolboy go from bottom to third place in his form when phenobarbitone was withdrawn!

Elderly chronic asthmatics present another formidable problem. The

person who develops asthma for the first time late in life has an unpleasant tendency to progress rapidly with little respite, and the prognosis is often a bad one. Bacterial allergy may play a part, but whatever the cause—and often it is quite unfathomable—the addition of persistent bronchial spasm to senile, degenerative changes in lungs and cardiovascular system, bodes ill for the patient. Aminophylline, intravenously on special occasions, and combined with barbitone in a nightly suppository, is a safer and more effective drug than adrenaline, and it is well to remember that cardiac asthma may simulate bronchial asthma or may coexist in the same patient. In such cases careful auscultation of the heart should reveal the tell-tale triple rhythm, particularly when listened for immediately after minor exertion, such as getting undressed.

COMPLICATIONS

No article on the care of the chronic asthmatic is complete without mention of complications, which may beset him at any time and which may easily prove fatal. These are in addition to those already mentioned as being almost part and parcel of the disease.

The most common complication is *emphysema*. It is not unusual to see patients referred for further advice and treatment for their asthma when they are really suffering from emphysema, their asthma having burnt itself out over many years. Such patients are usually men in their late forties and early fifties. Their complaint is shortness of breath, with wheezing on exertion. One leading question will usually serve to distinguish them from those suffering primarily from asthma: 'What are your nights like?' The asthmatic will tell a story of broken nights, with spasm coming on at rest in the early hours. The emphysematous patient says that his nights are good, that he can lie flat, and that he is free from symptoms so long as he does not have to move, but that minor exertion such as dressing immediately provokes dyspnœa with slight wheezing. Such patients are somewhat cyanosed, sometimes grossly so, and usually have a low blood pressure, with dusky complexion, stained conjunctivæ, and hunched shoulders. Their physical activities have of necessity to be severely restricted, but can be improved appreciably by concentration on diaphragmatic and abdominal breathing exercises, and by the use of antispasmodics, such as adrenaline and ephedrine. Most important of all, they must be protected from secondary respiratory infections. Antibiotics must be given at the first sign of infection, otherwise the patient may die of combined respiratory and pulmonary heart failure within a few hours or days, being admitted semi-conscious to hospital with black cyanosis, with greatly lowered arterial oxygen saturation, and with high arterial carbon dioxide content. The clinical and physiological state of these patients demands oxygen.

Pulmonary heart-disease is a late and very serious complication. Its onset is insidious and difficult to detect clinically, œdema being only a terminal sign. One of the earliest and most reliable signs is the electrocardiographic

demonstration of the so-called pulmonary P wave. Treatment must essentially be prophylactic, aiming at the prevention of its development, thus emphasizing once more the importance of the early treatment of bronchial spasm and infection.

A fatal issue at any time in a chronic asthmatic's career is common enough to warrant serious consideration. A respiratory infection is often the immediate cause of sudden deterioration leading to death, especially in elderly subjects. Young adults, however, are by no means immune from sudden fatalities. Necropsy in such cases usually shows all the bronchioles to be plugged by tenacious mucus, producing mass peripheral asphyxia. Small wonder that the patient has to struggle with all the accessory muscles of respiration to exist at all. It will be clear that in such cases, morphine, by depressing the respiratory centre and, even more important, by producing a pleasant 'don't care' state of mind which inhibits the conscious will to fight, quickly causes total respiratory failure—and in many cases is a real accessory to the fatal act.

Some young adult asthmatics during extreme spasm have such distended, fixed chests, with expiratory excursion so prolonged and distressed, and inspiratory phase consequently so short and inefficient, that the intrathoracic negative pressure is reduced to a level whereby the return of blood to the right heart is seriously diminished and the output from the left side is correspondingly small. This results in peripheral circulatory failure, which in turn leads to loss of consciousness and sometimes death. Spontaneous tension pneumothorax is a rarer cause of sudden death in young adults; in older asthmatics the pleura is seldom free and rupture causes only a localized, partial pneumothorax.

SUMMARY

I conclude on a more optimistic note. The care of the chronic asthmatic pays good dividends in the vast majority of patients if certain fundamental facts in the natural history, etiology and treatment of the condition are remembered and observed. Foremost of these is the necessity of recognizing the multiplicity and diversity of the factors concerned, and of combining expert knowledge with sympathy, understanding and encouragement. The tendency to treat all asthmatics by one specialized line of treatment, only too often practised, should be deplored.

May I suggest that practitioners who, as already emphasized, must bear the brunt of the management of these unfortunate patients, set aside during the week perhaps an hour or more for a small asthma clinic, where time can be given to probe the problems of the new case and to adjust the management of the old case? Attendance after the first few weeks need not be frequent, but should be regular. Time spent in this way would reduce the number of unsatisfactory attendances of such patients at the busy main surgery, and would materially reduce the number of emergency visits paid to the chronic asthmatic.

BRONCHIECTASIS AND ITS TREATMENT

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BRONCHIECTASIS denotes bronchial dilatation. It varies in extent from clinically insignificant dilatation of a single bronchus to widespread disease in both lungs which may be crippling and even fatal. There may be no symptoms; but expectoration, hæmoptyses and recurrent pneumonia are liable to occur. Both medical and surgical treatment have much to offer.

MECHANISM

If, as is the custom, bronchiectasis is taken to indicate merely an abnormally wide calibre of one or more bronchi, then it is as well to contrast 'ordinary' bronchiectasis with the less familiar dilatations which occur as complications of other diseases of the lungs. By 'ordinary' bronchiectasis is meant the common run of patients in whom the clinical features suggest bronchiectasis and whose dilated bronchi, usually in the lower lobes, fill easily with iodized oil and can thus be outlined radiographically. In the less familiar group there are those with a fixed bronchial obstruction such as a carcinoma, tuberculous stenosis, or foreign body, in whom pathogenic organisms behind the obstruction initiate a pneumonia with consequent invasion and distortion of the bronchial walls; sometimes the larger bronchi are ballooned out by the increasing pressure of pus. Further instances of bronchiectasis occurring as a complication of other diseases are seen in patients with chronic infections, particularly chronic pneumonia, lung abscess and tuberculosis. Here, it would seem, the bronchial walls become involved in the general inflammatory process and eventually become irregularly distorted, scarred and dilated with the addition, occasionally, of epithelialized cavities from the original disease. Hence it is essential, in assessing bronchiectasis, to regard the lungs as a whole and to determine whether or not any other disease coexists.

The mode of production of 'ordinary' bronchiectasis is by no means certain; further, there are considerable variations in the types of dilatations which develop. Certainly atelectasis is closely related. If a lobe or segment of lung collapses, such as is seen quite commonly a day or two after an abdominal operation, bronchograms show that the larger bronchi are evenly and abnormally dilated; if the lobe or segment re-expands within a few days, further bronchograms show that the bronchi have returned to their normal calibres. This is usually referred to as 'reversible bronchiectasis', the bronchi showing 'cylindrical' dilatation. If there is a delay in re-expansion the cylindrical bronchiectasis may become permanent, despite apparently adequate re-aeration of the surrounding lung.

The longer an atelectasis persists, the greater are the chances of infection.

In a collapsed lobe or segment the larger bronchi remain patent by virtue of the C-shaped plates of cartilage which hold them open, but the smaller bronchi, bronchioles and alveoli become airless and bathed in pulmonary secretions. There is thus an excellent environment for the multiplication of bacteria, which leads to pneumonia and eventual fibrosis. Bronchograms, after an interval, will show irregular dilatations of the larger bronchi (saccular bronchiectasis), and microscopic sections will confirm that smaller bronchi, bronchioles and alveoli have been replaced by masses of chronic pneumonia and scar tissue. Occasionally parts of the bronchial tree become ballooned out behind a partial obstruction, probably as a result of retained secretions, giving the so-called cystic bronchiectasis.

ETIOLOGY

Bronchiectasis rarely develops after childhood, except as a complication of some other disease, as already described. Almost always there is a history dating back to an early age of chestiness or of winter cough and sputum, or of colds going down to the chest. Often there is a clearly defined illness from which all respiratory symptoms derive. The most important of these are pneumonia, bronchitis, whooping-cough and measles, any of which may initiate or be superimposed upon a chronic respiratory catarrh; primary tuberculosis, the other important cause, is often suspected and can sometimes be confirmed radiologically. All these childhood infections are liable to produce pulmonary collapse and it is this, if it persists long enough, which determines the site and extent of the bronchiectasis. Troublesome symptoms may develop at once or may not appear for many years, which accounts for the great variation in age of patients at the time of diagnosis. The sexes are equally affected.

CLINICAL FEATURES

There are five cardinal clinical features, each of which must always carefully be assessed.

Cough and sputum.—There is invariably some degree of bronchiolar and alveolar obliteration in a bronchiectatic area, and in an average case the effective alveolar surface distal to the affected bronchi is considerably reduced. This means that little air passes along the bronchiectatic bronchi during breathing or coughing, and any secretions that may be in them tend to stagnate. These secretions may remain remarkably scanty and innocuous for years, but sooner or later they usually become purulent. The volume of expectoration thus varies from a trace to half a pint or more; in an average case it is some two to five ounces a day. It may be mucoid, mucopurulent or purulent and, if there is much stagnation and anaerobic organisms are active, very offensive. The volume of expectoration tends to be greater in winter than summer and may be increased by upper respiratory infections.

Hæmoptysis.—The chronic inflammatory changes in the walls of the

bronchiectatic bronchi are naturally irregular: tufts of granulation tissue and small varices are liable to develop and occasionally small arteries are eroded. The resultant hæmoptyses, which vary from streaks of blood to a pint or more, are a characteristic of bronchiectasis and occur in the majority of cases, sooner or later. Once they start they are likely to recur and to increase in volume. They are commoner in adults.

Pneumonia.—In some ways bronchiectasis is a misnomer since it directs too much attention to the shape of the bronchial walls. Of equal importance are the changes which take place between the affected bronchi. It seems that bronchiectasis cannot develop without there being damage to the adjacent lung. Most often this takes the form of a mixture of collapse, fibrosis and chronic pneumonia. Even when there is apparently good aeration, and this is somewhat rare, some degree of bronchiolar obliteration, emphysema and fibrosis is usually present. Chronic or recurrent pneumonia is always to be feared and may cause much more ill-health than the bronchiectasis itself. Also, to some extent the amount of chronic pneumonia governs the amount of sepsis in the bronchi, and conversely, pus in the bronchial tree may feed the pneumonia.

Secondary changes in the lungs.—Bronchiectatic pus is a constant menace to the rest of the lungs. Inevitably the whole of the bronchial tree becomes inflamed in varying degrees and, if the pus persists, fully developed chronic bronchitis may occur with its habitual complications of bronchospasm and emphysema. The pus may also infect healthy lung tissue and lead to pneumonia.

Secondary changes elsewhere.—Prolonged pulmonary suppuration produces a chronic toxæmia which undermines the general health of bronchiectatics. This shows itself as lethargy, an unhealthy complexion, failure to gain weight and clubbing of the fingers. In children there may be stunting of growth. Metastatic abscesses may develop, of which the most serious is cerebral abscess. Occasionally, amyloid disease supervenes.

Abnormal physical signs in the chest may be related to the ectatic bronchi, to the associated collapse and consolidation, or to the secondary changes in the rest of the lungs. Bronchial secretions give rise to various moist sounds according to their viscosity, provided sufficient air is reaching them during respiration; if the bronchi are relatively dry they may act as resonating chambers and produce the signs of cavitation. The associated collapse and consolidation, which are usually present, cause a flattening of the chest wall and a displacement of the surrounding structures towards the affected part. A careful assessment of the rest of the lungs for bronchitis, bronchospasm and emphysema must always be made.

RADIOLOGICAL DIAGNOSIS

Although bronchiectasis can often be strongly suspected or even virtually proved on clinical grounds, the ultimate diagnosis depends entirely upon

bronchography. This method of investigation is a tricky one and, if good pictures are to be obtained, the operator must be well trained and the x-ray equipment adequate. First, the bronchial tree must be freed of secretions so far as possible; this is best done by repeated postural drainage for several days beforehand, in order to ensure that the oil is able to enter the affected bronchi. Experience has shown that the bronchi on the right are best seen in a lateral film and on the left in an oblique film. Hence, unless there is a good reason to the contrary, the right side is filled before the left regardless of which side is suspected of being bronchiectatic, in order that the bronchial trees may be seen without being overlapped by shadows from the opposite lung.

After anæsthetizing the back of the throat, oil is run over the back of the tongue from a 20 ml. syringe and allowed to trickle down to the lungs. In order to assess the extent of the bronchiectasis, the oil must be directed by posturing into all the major bronchi and pictures taken before it has had time to reach the alveoli; this necessarily implies close cooperation between the patient, the operator and the radiographer. There are three bronchopulmonary segments in each upper lobe, two each in the middle lobe and lingula, six in the right lower lobe, and five in the left lower lobe, making a total of twenty-one; if surgical treatment is contemplated all segmental bronchi must be filled, and if any are missed, more oil must be run in. It is only in patients who are unfit for surgical treatment that anything short of this degree of accuracy is permissible, but even for medical treatment inadequate filling is most unsatisfactory.

In addition to outlining the extent of the disease, bronchography demonstrates the type of bronchiectasis, upon which is based an opinion as to its reversibility. If there is any bronchial obstruction, as by carcinoma, this can often be demonstrated.

TREATMENT

Bronchiectasis is, in many instances, a preventable disease. It arises in the majority of cases as a sequel to atelectasis, which is itself a complication of pneumonia, bronchitis, whooping-cough or measles in childhood. Hence prophylaxis consists in preventing so far as possible the original infections, treating them adequately once they have developed, especially by antibiotics, and taking every measure to promote rapid re-expansion when atelectasis occurs. When there is a fixed bronchial obstruction, such as by carcinoma, adenoma, tuberculosis, or a foreign body, bronchiectasis may be averted by relief of the obstruction, but often radical surgical treatment is necessary because of the nature of the obstruction. A chronic pneumonia or lung abscess must be treated early and vigorously if bronchiectasis is to be avoided.

Once it has developed, bronchiectasis may be treated medically or surgically and many factors enter into the choice of treatment. An assessment

of the probable cause must be made at the outset. There may be an obvious history of 'chestiness' dating back to a respiratory infection in childhood, and bronchograms may show that the bronchi draining the affected area are free from obstruction, so that a fairly confident diagnosis of the commoner type of bronchiectasis may be made. If the symptoms are of shorter duration or the draining bronchi are in any way suspicious, a bronchoscopy must be performed, particularly with a view to seeing if there is an associated bronchial carcinoma. Another question which must be decided early is whether or not the bronchiectasis is reversible. The saccular and cystic forms are irreversible, but the cylindrical form is not necessarily so. Cylindrical bronchiectasis in an aerated lobe usually persists, but when there is atelectasis in addition the bronchi may return to normal if and when the lobe re-expands. Only rarely does a lobe expand after it has been collapsed for more than six months, but an arbitrary time limit of one year is usually allowed. This implies that if a patient is found radiologically to have a collapse and cylindrical bronchiectasis, and bronchoscopy shows no cause for it, he is treated medically for one year, with periodic skiagrams before resection is seriously considered, unless, as is rarely the case, there is some very good reason to the contrary.

MEDICAL TREATMENT

Medical treatment is all that is available to the majority, and is directed towards reducing infection to the minimum and aerating any collapse that may be present. For the expectoration of sputum the normal mechanism of coughing is often ineffective because the number of alveoli distal to the ectatic bronchi is so reduced that insufficient air can be breathed into them to produce enough force to dislodge the sputum during the act of coughing. In order to overcome this to some extent an elaborate system of *postural drainage* has been devised, and the optimum position for drainage of the various lobes and segments has been determined. The upper lobes drain well in the standing and sitting positions, so that little therapeutic posturing is necessary. The middle lobe or lingula drains best with the patient lying on his back tilted somewhat to the opposite side and with the foot of the bed raised. This is only a moderately efficient form of treatment because there is so often a bronchial stenosis which obstructs the outflow of secretions. The lower lobes are the most commonly affected in the ordinary cases of bronchiectasis, and it is for them that postural drainage is most effective.

The patient is placed prone on a bed or couch with the head and body as far as the waist projecting over the end; by placing his hands on the floor the degree of tilt of the body can be adjusted so that any secretions in the lower lobes will tend to run out, he is then encouraged to cough and is percussed over the lower lobes. If bronchiectasis is present some opaque, greenish-white sputum will probably be expectorated.

In established bronchiectasis, which has been accurately assessed broncho-

graphically, a course of postural drainage is necessary if there are any abnormal secretions in the bronchi. The method of tipping by lying over the edge of a bed is uncomfortable, and cannot usually be maintained for more than a few minutes because of a feeling of constriction in the head or neck. The best method is to have a frame upon which the patient can lie with his buttocks uppermost, his body and head down one side and his legs down the other; the sides of the frame upon which he lies should form a right angle. The time to be spent on the frame varies with the volume and character of the sputum. Patients expectorating five ounces (140 ml.) or more of pus would be well advised to abandon work for a month or so and remain on the frame for as long as possible during the day; some patients can tolerate it all day, coming off only for meals and toilet purposes. Certainly, several hours each day should be the aim, until the sputum has been reduced to no more than a trace. There is, unfortunately, a discrepancy between the amount of expectoration and the amount of pus in the bronchi, and sometimes a gush of many ounces of pus will suddenly be evacuated after several days of treatment. In any event, an 'infected' bronchiectasis must be given a good chance of becoming 'dry'. Once this has been achieved it is as well to tip for ten to fifteen minutes morning and evening for several weeks and then whenever there is a threat of a return of sputum. If for some reason a patient cannot acquire a frame, a trunk with pillows on top and a mattress across the pillows may serve as a makeshift and is infinitely more comfortable than tipping over the side of a bed.

Antibiotics play a large part in treatment, acting upon the ectatic bronchi, pneumonia in the adjacent lung tissue, and any inflammatory changes there may be in the remainder of the lungs. When there is much infection penicillin in large doses, i.e., 500,000 units twice daily for a week, combined with postural drainage, is usually the most effective. If this is unsuccessful, aureomycin, 0.5 g. six-hourly for a week, or chloramphenicol, 1 g. thrice daily for a week, may be tried.

Sticky secretions may be loosened by the inhalation of Friars' balsam for a quarter of an hour, preferably immediately before postural drainage. Of the various expectorants, mixture of sodium chloride (B.P.C.) is probably the best.

The close correlation between infections of the nose and throat and bronchiectasis is well known. Whilst there is no real evidence that one may cause the other, there is no doubt that either may maintain infection in the other. The organisms in the two sites are often remarkably similar and a recrudescence of infection in the upper respiratory tract often aggravates the symptoms of bronchiectasis. Conversely, the former practice of encouraging bronchiectatic patients to sleep on their frames, so often led to upper respiratory infections that it has now been abandoned. The present view concerning the treatment of nasopharyngeal infections in bronchiectatics being treated medically is that it should be thorough but not radical. If

pulmonary resection is contemplated, then every effort should be made, such as by the Caldwell-Luc operation, to rid the nasopharynx of infection shortly before operation, on the assumption that re-infection from the lungs is unlikely to occur postoperatively.

Climatic treatment has a place. The drier atmosphere of South-Eastern England will tend to lessen bronchial secretions if residence in a really dry, warm climate is unpracticable. The smoke-laden atmosphere of industrial cities should be avoided. Residence at the seaside is congenial during the summer, but the moist strong winds of winter may be distressing to the elderly. Ideally, a place should be chosen a few miles from the coast on dry soil and not too near a large city.

SURGICAL TREATMENT

The aim of surgical treatment is the resection of all bronchiectatic areas. For this purpose adequate bronchographic filling of all lobes, segments and subsegments is essential in order that no more than the irreversibly affected parts shall be removed. The following factors must always be considered before surgery is undertaken—

(a) *The age of the patient:* The ideal age is between about twelve and twenty, when the complications are negligible and the remaining lung tissue is likely to expand adequately to occupy the dead space. Excellent results are obtained up to the age of about thirty-five, but after that complications such as bronchial fistulæ and incomplete re-expansion begin to become troublesome. After the age of fifty, resections are virtually limited to patients with recurrent hæmoptyses or chronic pulmonary suppuration.

(b) *The extent of the disease* is often the determining factor. Occasionally it is limited to a single lobe, but often the right lower and middle lobes or the left lower lobe and lingula are affected, and these distributions are found in the bulk of successfully resected cases. More heroic measures, such as pneumonectomy or the removal of both lower lobes, are often successful. The more selective segmental and subsegmental resections are being increasingly practised. In extensive bronchiectasis resection of the most severely affected part is sometimes justified in the hope that medical measures may be able to control the remainder.

(c) *The nature of the symptoms:* If sputum and chronic pulmonary infection cannot be controlled medically, resection must be considered. Recurrent hæmoptyses, which are often large and for which there is no medical treatment, are sometimes an absolute indication for surgery. When atelectasis persists, especially in the presence of saccular bronchiectasis, resection is desirable on this score alone, provided that the patient is of a suitable age.

(d) *The state of the rest of the lungs:* Bronchitis, bronchospasm and emphysema are contraindications in proportion to their severity.

(e) *Toxic effects*, such as general ill-health, failure to gain weight, and

clubbing of the fingers usually indicate severe pulmonary infection and as such render surgical measures desirable.

(f) *Associated lesions*, e.g., carcinoma, lung abscess, tuberculosis or a foreign body, may modify the form of treatment.

The efficiency of pulmonary resection as practised today has been determined by adequate preoperative physiotherapy and postural drainage, the reduction of infection in both the upper and lower respiratory tracts to a minimum, advances in anæsthesia, careful dissection and ligation of the structures at the stump of the resected portion of lung, postoperative intrapleural suction in order to ensure re-expansion, and antibiotics at all stages. By diminishing the risks of operation there is necessarily a tendency to extend its indications, but even so, provided the bronchiectasis is not too extensive, excellent results are now constantly obtained in those of a suitable age.

BRONCHIECTASIS IN CHILDHOOD

In childhood, bronchiectasis poses particular problems. It is most likely to develop in children with chronic respiratory catarrh, or it may be a complication of the first respiratory infection, which it helps to perpetuate. At the time of diagnosis a high proportion of children are found to have enlarged tonsils and adenoids and an œdematous mucosal swelling of the bronchi. If acute bronchitis, whooping-cough or measles is superimposed, the further mucosal swelling, together with sticky bronchial secretions, may easily cause a bronchial obstruction which lasts long enough for collapse and secondary infection to occur, so that bronchiectasis should more properly be regarded as a complication of a general respiratory infection rather than as a disease in itself. This has an important bearing upon treatment, in that surgical resection is delayed if possible until the age of about twelve so that the effects of the removal of tonsils and adenoids and measures directed towards the promotion of good health may be observed, in the hope that the catarrhal state will settle down and with it, to some extent, the bronchiectasis. If there is gross saccular or cystic bronchiectasis with much sputum and signs of toxæmia, then certainly resection may be performed in childhood, but in the less severe cases there is much to be said for waiting until the respiratory catarrh has settled down and the diseased portions of the lungs can be more clearly demarcated.

CONCLUSION

Bronchiectasis usually dates from a respiratory infection in childhood. In adults it may be a complication of carcinoma of the bronchus, tuberculosis, lung abscess, chronic pneumonia, or a foreign body in the bronchial tree. It may give rise to secondary changes in the rest of the lungs and to a general toxæmia. Medical treatment, in the form of postural drainage and antibiotics, is often highly effective. Surgical resection is the only cure, and is particularly applicable to young adults with disease of limited extent.

EMPHYSEMA

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THE word emphysema means literally inflation and is used to describe several entirely different conditions.

TYPES OF EMPHYSEMA

There are two main groups: first, that in which air or gas is in an abnormal place; secondly, that in which the whole or part of a lung is abnormally distended. In the first group there are (1) surgical emphysema, and (2) interstitial emphysema; in the second, acute localized, acute general, chronic localized and chronic general emphysema.

In *surgical emphysema*, air is found in the subcutaneous tissues and has reached them by trauma, accidental or surgical. The condition is recognized clinically by the discomfort of the patient, in whom surgical emphysema of the neck produces pain, a sense of pressure or dyspnœa; of other parts, a sense of stiffness and sometimes pain. The parts involved are usually recognizably swollen, but not discoloured, and on palpation are found to crackle like a dry rubber sponge. The subcutaneous air is usually derived from an artificial pneumothorax or pneumoperitoneum, and is only of real importance when tension in the neck produces sufficient pressure on the great veins to impede the return of blood from the head and arms to the heart. It may also alarm patients unless its presence is explained. Hot poulticing to the neck usually relieves the pain and pressure fairly quickly, and it is very rarely that puncture of the skin is needed.

Surgical emphysema is an important sign in fracture of the ribs. It is often found even when there is no evidence of traumatic pneumothorax and always means that the lung has been damaged. This demands considerably greater care in management than an uncomplicated fracture.

Interstitial emphysema is caused by escape of air from a ruptured alveolus into the tissue of the lung. It occurs as an acute complication of such diseases as measles and whooping-cough, and only produces symptoms by pressure when the air finds its way into the tissues of the neck or into the mediastinum. The latter may cause heart failure by pressure on the veins on the right side of the mediastinum; this is, however, exceedingly rare.

Acute localized emphysema occurs when a part of a lung becomes airless as a result of bronchial obstruction when the neighbouring lung becomes distended to fill the space occupied by the collapsed part. It also occurs in bronchial obstruction when the obstruction is of the type which allows air to enter the lung but does not allow its escape. The former type of localized emphysema is unimportant compared with the primary lesion—the collapsed

lung; the latter is of considerable importance, as it may proceed to irreversible changes if the obstruction is not relieved.

Acute generalized emphysema is an occasional complication of whooping-cough, particularly when combined with measles, or of acute generalized bronchitis in children. It usually becomes unrecognizable soon after the subsidence of the original illness, but may conceivably be the cause of chronic general emphysema occurring in later life.

Chronic localized emphysema may be a perpetuation of an acute localized emphysema, but most commonly follows the healing of extensive tuberculous disease by fibrosis. The common appearance is of one or both apices densely shadowed and the corresponding bases abnormally translucent, the hilum appearing to be drawn up and the vessels becoming thinner towards the base. This condition is often accompanied by marked dyspnœa, probably due more to the displacement of the main vessels upwards than to actual loss of lung tissue.

An interesting case seen by me was one of fine fibrosis of the right lung following influenzal pneumonia. Clinically, the patient complained of dyspnœa, and the heart was found to be displaced to the right; radiologically, the right lung was denser and the left clearer than normal. Artificial pneumothorax on the right side, which allowed the heart to return to the midline, relieved the dyspnœa completely.

Where there is compensatory emphysema great care should be taken in exploring the pleural cavity, as traumatic pneumothorax is liable to occur. Treatment of this condition is that of the preceding tuberculous fibrosis.

Chronic generalized emphysema is the condition which usually comes first to mind in connexion with the word 'emphysema'—it also is divided into two types—the atrophic, in which the lungs are small, and the hypertrophic or large lung type.

THE MECHANICS OF RESPIRATION

In order to appreciate the development of emphysema it is necessary to recall something of the mechanics of respiration. Inspiration is produced by the action of powerful voluntary muscles which elevate the ribs, thereby increasing the anteroposterior diameter of the chest, and in consequence its capacity; the simultaneous contraction of the diaphragm increases the vertical size of the chest, thereby also greatly increasing its volume. This increase in capacity of the chest is filled by the action of atmospheric pressure.

Expiration, on the other hand, is a passive relaxation rather than an active expulsion of air. In quiet respiration the expulsive forces are the pull towards the mediastinum of the elastic fibres in the lung and the pressure upwards on the diaphragm exerted by the tone of the abdominal muscles, which must be maintained to keep the viscera in their normal position. Forcible expiration is achieved by contraction of the abdominal muscles and diminution in the size of the abdominal cavity by stooping forwards, thus forcing the diaphragm upwards. The ribs cannot be drawn downwards by

any real muscular effort, however, and in this way inspiration is a much more powerful action than expiration. Furthermore, in inspiration the bronchi become shorter and wider, thereby allowing an easy passage of air even though there be a partial obstruction, whereas in expiration they become longer and narrower and so may convert partial into complete obstruction.

The intrapleural pressure as measured with a water manometer is on the average about 8 centimetres of water lower than that of the surrounding atmosphere which represents the force of the elastic recoil of the lung; this is naturally greater in inspiration than in expiration, as in the former the elastic fibres are more stretched than in the latter. In emphysema the intrapleural pressure much more nearly approximates to that of the atmosphere, and in expiration may even exceed it. This increase in intrapleural pressure means that the pressure gradient between the abdomen and the chest is much flattened, and the return of blood to the right side of the heart, normally facilitated by relatively low intrathoracic pressure, is considerably impeded.

THE MORBID ANATOMY OF EMPHYSEMA

This is well summarized by Boyd (1950):—

'In true emphysema the lungs are very voluminous and they cover up the heart so completely that it may be quite invisible. They are of a characteristically pale colour owing to their lack of blood, and for the same reason the cut surface is peculiarly dry. Projecting on the surface many large blebs or bullæ may be seen, particularly at the apex, along the anterior margin and at the base, regions where the lung tissue is but poorly supported. The occasional rupture of these bullæ may lead to pneumothorax. An emphysematous lung can be recognized even with the eyes shut for it has a peculiarly soft feathery feel, quite different from the normal crepitant lung or the various forms of consolidation. The lung pits on pressure owing to loss of the normal elasticity.

'Microscopically the lung presents a delicate lace-like structure. The air vesicles are few in number and of great size, the septa between many of the adjacent alveoli being broken down. In the remaining septa the vessels are greatly constricted if not obliterated. It is this avascularity which is responsible for the pallor of the lung, for the dryness of the cut surface and for the obstruction to the pulmonary circulation to be referred to immediately. The obliteration of the vessels is supposed to be due to the increased intra-alveolar pressure, and in turn it must lead to further atrophy of the alveolar walls'.

This obliteration of the lung capillaries has the effect not only of diminishing the amount of blood exposed for gas exchange, but also produces a rise in the pulmonary arterial pressure, which eventually gives rise first to hypertrophy, then to failure of the right ventricle. The obliteration of the smaller vessels produces the diminution of lung striation as seen radiologically, and the increased pressure causes dilatation of the proximal parts of the pulmonary arterial tree and produces the increase in the hilar shadows.

CHRONIC GENERALIZED EMPHYSEMA

In passing, mention should be made of *chronic generalized atrophic emphysema* or *small-lunged emphysema*. This condition is part of a generalized

senile degeneration: there is marked kyphosis of the spine, the chest is deeper from before backwards than from side to side and is often flattened at the side; there is a general weakness but usually no severe dyspnœa, and cyanosis is not marked. The lungs are not larger than normal; indeed they tend to collapse when the chest is opened. Nor are there any emphysematous bullæ on the surface. But there is the same atrophy of the alveolar septa, so that several alveoli are thrown into one, and large air spaces are formed. In some cases there seems to be atrophy of the septa from defective nutrition.

It is *chronic hypertrophic generalized* or *large-lunged emphysema* with which the remainder of this article is concerned, and in this connexion it is interesting to recall the words of Cabot (1930):—

'Whether there is any clinical picture or any physical signs are recognizable as corresponding with these lesions I am quite uncertain. Till 1921 I thought I could recognize emphysema. The following facts have disillusioned me. In 12 cases diagnosed as emphysema at the Massachusetts General Hospital only 3 showed any emphysema post mortem. On the other hand of the 153 cases demonstrated post mortem only 7 were recognised in life. The following description refers to a clinical entity which we have been accustomed to call emphysema of the lungs. I am now convinced that this clinical entity (barrel chest, hyperresonance, feeble prolonged expiration, etc.) is usually not connected with emphysema and that the pathological entity "emphysema" is often present without recognizable physical signs. I know nothing to-day about the physical signs of emphysema. The thoracic condition about to be described is very possibly a disease or disorder of the chest walls themselves, leading to various changes in resonance, respiratory murmur, tactile fremitus, etc. As a guess, I will call this condition "The Barrel Chest" and describe under this provisional term what is usually described as emphysema.'

It was first accurately described by Laënnec, and most practitioners would agree with Cabot that the condition is a clinical state rather than a pathological entity. It is interesting to read Stokes (1837) on this condition:—

'It seems to me that in adopting the name of dilatation of the air cells for this disease, we avoid much error and confusion. The term emphysema of the lung, given to it by Laënnec is improper, inasmuch as emphysema is not the principal characteristic of the disease, and though a frequent, yet still by no means a constant complication. Indeed it seems certain that even if we admit the existence of the pleural vesicles of Laënnec to have been produced by rupture of the cells, yet that this may exist without true emphysema of the lung. And it is difficult to conceive how emphysema could exist in the lung without becoming diffused over the body.

'This disease consists essentially in a dilatation of the air cells. The lung becomes enlarged and the whole quantity of air within the thorax is increased.

'Various explanations have been given of the formation of this disease. It has been conceived that the long continued and violent coughing acts in distending the air cells beyond their ordinary dimensions, and from this frequently repeated and long dilatation they at last become permanently enlarged. In addition to this it is held that the viscid secretion that exists in the minute bronchial tubes acts in blocking these up during expiration, the force of which is not so great as that of inspiration, and hence assists in producing dilatation of the air cells by keeping them in a permanently distended state. There can be little doubt that both these causes act, and their combination seems sufficient to explain the lesion.

'To the practical physician, however, the great point of consideration is that this disease of the lung is the result of bronchitis.

'Patients labouring under this disease are affected with an habitual dyspnœa which in the earlier periods is often mitigated in summer, to return with violence during the winter: they are also liable to repeated attacks of what might be termed

a congestive bronchitis, during which the difficulty of breathing becomes extreme.

'The complexion is generally of a dusky hue and the countenance, though with an anxious and melancholy expression, has in several cases a degree of fullness which contrasts remarkably with the condition of the rest of the body.

'The lower lip is enlarged, and its mucous membrane averted and livid, giving a peculiar expression of anxiety, melancholy and disease to the countenance.

'On percussing the chest, in a case where the disease is decided, we observed that the sound is morbidly clear. It is not, however, tympanitic as in pneumothorax but may be described as the maximum of the true pulmonary sound.

'It is but little if at all increased on a deep inspiration, in which it differs remarkably from the sound of the healthy lung, but agrees with that of its solidified state. In fact this character, though occurring in states of the lung so opposite as its rarefaction and solidification, is yet owing to the same cause in both, namely the greatly diminished volume of air which can enter at an inspiration.

'One of the first circumstances which strikes the observer in this affection is the want of accordance between the inspiratory efforts and the sound of pulmonary expansion; the first being evidently excessive and the latter extremely feeble.

'In cases of ordinary bronchitis even when the minute tubes are engaged, this remarkable disproportion between the inspiratory efforts and the sound of expansion is either not observed or occurs in a much smaller degree.

'From the position of the diaphragm and its inferior mechanical support, we should expect, a priori, that it should yield more to mechanical pressure than the intercostals. And such I have ascertained to be the fact, as while I have often seen displacement of the diaphragm, in no case did I find that the intercostals were similarly affected.

CLINICAL SIGNS AND SYMPTOMS

The clinical picture of chronic hypertrophic emphysema or barrel chest is of a man (the condition is much commoner in the male) forty years of age or more, who gives a history of chronic cough, continuous or intermittent over a period of years, and gradually increasing dyspnœa.

He is found to have a large chest with the anteroposterior diameter equalling or exceeding the lateral; the respiratory movements of the ribs are slight or non-existent; the percussion note is hyperresonant, and the areas of cardiac and hepatic dullness are decreased or absent; the breath sounds are usually faint and are described as showing poor air entry. There may or may not be scattered rhonchi and râles; more usually there are no adventitious sounds. The heart sounds are distant and the apex beat may be displaced downwards; the heart rate is usually somewhat increased. The liver may be palpable below the right costal margin.

X-ray examination on fluoroscopy shows the diaphragm to be depressed and its excursion poor, the vascular shadows usually dense in the hilar region, whilst the remaining parts of the lung field are abnormally clear. The heart shows right ventricular enlargement in a certain number of cases. Films may show subpleural bullæ, but this is uncommon. This state of emphysema must be distinguished from two other common conditions:—

(1) *Chronic asthma.*—The patient is as likely to be a woman as a man, may be younger than the typical emphysematous patient, and gives a clear history of recurrent paroxysmal dyspnœa. The asthmatic stoop is characteristic, as the neck appears to grow out of the front of the chest. There is usually a prolonged expiratory wheeze and the patient derives benefit from

the use of antispasmodic drugs. On the other hand in most cases the chronic asthmatic will also have developed emphysema.

(2) *The large-chested man*, who is usually grossly overweight, has a florid complexion which may be slightly cyanotic, and probably has an increased blood pressure. The increased anteroposterior diameter of the chest may simulate emphysema but is due largely to increased fat and muscle. The respiratory movements of the ribs are adequate as is the 'air entry'. On x-ray examination the diaphragm is found to be high instead of low and the lung striations normal, the extreme translucency found in emphysema being absent in this condition. The dyspnœa of which such patients often complain is due to excessive weight and minor degrees of heart failure.

DIAGNOSIS AND PROGNOSIS

The *differential diagnosis* is made clinically and radiologically and rarely presents much difficulty. Mechanical *respiratory capacity tests* are of great scientific interest, but are not of any great help in diagnosing or treating emphysema. The vital capacity as a single test is a comparatively simple one and will give quite a useful amount of information. The estimation of the reserve air (Herxheimer, 1949) is but little more difficult and adds a certain amount of information to the clinical picture. The estimation of the residual air is a matter of considerably greater technical difficulty, but serves to confirm scientifically the clinical impression that the capacity of the patient's chest is greatly increased whilst the flow of air is greatly diminished, so that gas exchange is inefficient, there is insufficient intake of oxygen and inefficient output of carbon dioxide, with the result that the patient is dyspnœic and cyanosed.

The electrocardiogram in emphysema, as in chronic asthma, shows usually right-axis deviation, a vertical heart and enlarged P waves, the last being one of the earliest electrocardiographic changes. As heart failure develops there is the full picture of chronic cor pulmonale.

The cause of chronic emphysema is *long-continued cough* usually with recurrent bronchial infections, or long-continued asthma, although as the disease is uncommon before the fifth decade, there may be a degenerative element present; but the most important factor is prolonged coughing.

The *prognosis* depends upon the degree to which the emphysema has progressed and the amount of heart failure present. Once definite heart failure is established with œdema and enlargement of the liver, the prognosis is very grave. Wood (1951) gives the expectancy of life as about a year from the onset, but many patients are seen with apparently gross clinical emphysema, who live for many years despite a slight amount of dyspnœa and cyanosis. The prognosis then, in the absence of frank heart failure, is indefinite.

Early emphysema is difficult to recognize as there are no symptoms, and it may only be suspected on a careful clinical and radiological examination for the cause of a chronic cough.

TREATMENT

The treatment of established emphysema is purely symptomatic. First, strenuous efforts should be made to stop coughing. The use of tobacco, particularly in the form of cigarette smoking, should be forbidden—a veto which will almost invariably be disregarded as it is in cases of intermittent claudication. However, it is a veto which should be pressed as vigorously as possible, as those smokers with chronic cough who can be persuaded to stop smoking, almost invariably note a marked diminution in the cough. Respiratory infections should be treated as soon as they arise, and treatment should be maintained until the infection has subsided. Chronic sinusitis is a common cause of chronic cough; the state of the sinuses therefore should be examined and any abnormalities corrected so far as possible. Chronic irritation of the ear in otitis media or externa may also be the root of the trouble. Antispasmodic expectorant mixtures seem to give a considerable amount of relief in many cases, as do inhalations of some of the well-known proprietary preparations. In advanced cases a period of rest in bed from time to time with inhalations of oxygen will add to the patient's comfort.

Physiotherapy, in the form of appropriate *breathing exercises* directed towards helping the expiratory effort, is the most effective treatment which can be given after the treatment of chronic cough. It is important that the movements of the diaphragm should be developed and if possible the expiratory lowering of the ribs. This last may be assisted by the use of an elastic jacket: an anchoring belt and braces are joined by oblique elastic bands which counteract the lift of the ribs; with its help an emphysematous patient derives subjective relief and shows a slight increase in vital capacity.

All efforts at treating the established condition, however, are of but slight value, and it is much more important that its development should be prevented by the prevention of chronic cough. It is becoming more common for those with chronic cough to seek medical advice, as publicity about tuberculosis has increased and fear of it decreased. Those patients who develop frequent coughs for which no obvious cause can be found, should be treated strenuously with antibiotics or other suitable means whenever the cough develops, and it is worth trying desensitization with autogenous or stock vaccines, although rarely do these seem to give much benefit. Vasomotor rhinitis or other allergic states may often be relieved by the use of antihistaminics and occasionally be prevented by desensitization.

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THE PROBLEM OF THE CHILD WITH A CHRONIC COUGH

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A CHRONIC cough in childhood is so common a complaint that there is some danger that it will not attract the attention which it may deserve. The first point to establish is the fact that the cough is really chronic; that is to say that the cough is a manifestation of some continuing cause and not merely recurrent, the manifestation of repeated acute respiratory infections. For the latter are also common in childhood, and especially in the early school years. To establish the point, a careful history is essential, for we are all familiar with the parent who loosely but understandably says that her child 'never stops coughing'.

In reviewing the differential diagnosis of the cause of a chronic cough it is important to understand the possible mechanisms of the symptom. A cough, after all, is a reflex the initiation of which depends upon appropriate irritation of nerve endings in the larynx or in the sensitive areas of the bronchial tree. It may, of course, be caused by a reflex following less straightforward paths. Irritation of the middle-ear may cause cough; certainly pleural irritation can cause a painful and useless cough; mothers often speak of a 'stomach cough', by which they usually imply a non-productive, brassy cough which clinicians associate with tracheal irritation.

CHRONIC UPPER RESPIRATORY INFECTION

The pædiatrician recognizes that the first line of defence against infection of the respiratory tract is the ring of lymphatic structures comprising the tonsils, the adenoids, and the cervical lymphatic glands. These are often the site of infection, and the clinician's first responsibility is to decide whether these structures are adequately functioning as a defence mechanism: healthy between the attacks of acute inflammation when they are doing their duty in coping with the air-borne pathogens of others; or whether these structures have already lost the battle and have themselves become hotbeds of organisms, the site, in other words, of chronic infection.

To decide this point the tonsils may be inspected at least four weeks after the last acute infection if a sound judgment is to be made. If, at this time, there is evidence of continuing infection, such as pus in the crypts, associated perhaps with scarring or with hypertrophy and, it may be, enlarged and tender glands in the anterior triangles of the neck, the diagnosis of chronic tonsillar infection may be made. This is the indication for their removal. There is no other indication for tonsillectomy.

When the adenoids take part in a similar pathological process the signs of their involvement will depend upon their position in the upper nasal space. Thus they may, by their hypertrophy, interfere with drainage of the middle-ear through the Eustachian tube and give rise to recurring middle-ear infection. Or they may block the ostia of the paranasal sinuses, with resulting sinusitis, demonstrable by x-rays and by proof-puncture. Sometimes by their hypertrophy they block the nasal airway, and the result is snoring and mouth breathing. By impairing the sense of smell the patient is robbed of his appreciation of, and appetite for, food. Finally, by producing a chronic suppurative exudate a postnasal drip into the larynx may result in a chronic cough. So, even when a mucopurulent discharge dripping down the posterior pharyngeal wall cannot actually be seen, it may be suspected that a chronic cough is due to chronic upper respiratory infection if: (a) the tonsils are obviously septic; (b) the nasal airway is blocked; (c) there is a loss of appetite; (d) the middle ear is the site of repeated infections; or (e) the paranasal sinuses are the site of chronic infection.

BRONCHIAL INFECTION

Bronchitis as the cause of a chronic cough will be diagnosed by the presence of rhonchi and coarse or medium râles. These familiar physical signs are indications of excessive secretion by the mucous glands of the bronchial mucous membrane. But chronic bronchitis is almost always a secondary condition in childhood, secondary often to the chronic upper respiratory infections already described. It may attract attention after measles or whooping-cough, during which there has been a generalized acute catarrhal infection of the whole bronchial tree and upper respiratory tract. The recognition of persisting signs of bronchitis should therefore be an indication for a search for a site of infection in the tonsils, sinuses and adenoids, and for the treatment of such infection when discovered.

The importance of a persisting infection of the bronchi lies chiefly in its secondary effects, especially collapse of lung and bronchiectasis.

COLLAPSE OF LUNG

This is a happening which is much more common in childhood than in adult life. The usual cause of the collapse is the occlusion of a bronchus or bronchiole by a plug of infected mucus. This is quite a common happening in the course of an attack of pertussis, when the mucous secretions of the bronchi are usually thick and tenacious. It may happen, however, in the course of an attack of acute bronchitis; in this condition, in contrast to pertussis, there is quite often some enlargement of the peribronchial lymph glands, and these enlarged glands may, by pressing on the bronchi, contribute to their occlusion. Through the bronchoscope it may be seen that the normally circular lumen of the bronchus is distorted into a narrow crescent which can more readily be blocked by sputum.

Once blockage of a bronchus has occurred the air in the part of the lung supplied by that bronchus is absorbed and collapse of the peripheral lung follows. As in most cases the blocking plug consists of infected material, it is not surprising that the collapsed lung tissues become infected and a localized patch of pneumonitis is soon associated with the collapse, inflammatory exudate fills the previously collapsed air sacs and the picture then becomes that so often described by the radiologists as 'collapse consolidation'. Such consolidation will often persist after the obstruction to the bronchus has shifted.

BRONCHIECTASIS

For the production of those localized dilatations of the bronchi, fusiform or cylindrical and, less commonly, saccular, which constitute this condition, the prime necessity seems to be a fairly prolonged blockage of part of the bronchial tree by a plug of infected material. This blockage leads to localized collapse, and the localized infection at the site of and distal to the obstruction leads to infection and destruction of the bronchial wall itself. The mucous lining of the bronchus, its muscle and its elastic fibres are destroyed in the process of ulceration, and the accumulating mucopurulent secretion within easily distends the weakened walls. This process of distension is made the easier by the lack of air-containing lung surrounding the bronchus, for normally the walls of a bronchus are supported by the air-filled alveoli of the healthy lung surrounding it.

Eventually the obstructing plug will liquefy and loosen and will then either be coughed up together with the purulent material distal to it in the now established bronchiectatic cavity, or flow over into surrounding bronchi and there set up new patches of bronchitis or broncho-pneumonia. The stage is now set for a series of localized low-grade infections, a very common cause of chronic cough in childhood. It is because of the frequency of the occurrence of this state of affairs that experienced clinicians are reluctant to accept the diagnosis of 'chronic bronchitis' as a complete explanation of a persistent or frequently recurrent cough.

Suspicion that such a state of affairs is the cause of a child's chronic cough should arise in those cases in which the history suggests that there has been some episode, or perhaps even repeated episodes, of acute respiratory infection, associated with physical signs of collapse or consolidation and the subsequent appearance of a purulent sputum. Such a history warrants a full radiological examination, including bronchography. It is not necessary—and indeed it is bad practise in these days—to wait for the appearance of clubbing of the fingers and toes, cyanosis, and fœtid sputum before deciding that bronchiectasis is the probable diagnosis. It is bad practise because much can be done. Indeed it can be said that it is not by any means established that fusiform bronchiectasis in childhood and in its

early stages is an irrecoverable and irreversible condition. There is some reason to suppose that if the active infection of the bronchial tree can be controlled the natural processes of growth will result in a considerable improvement of the bronchial deformity.

It is this deformity which makes it possible for the diseased bronchi to act as reservoirs of infected pus. In the past, emphasis was put on the disability caused by the interstitial fibrosis of the lung secondary to the repeated attacks of broncho-pneumonia. Indeed this fibrosis used to be regarded as the important cause of bronchiectasis. Appreciation that the fibrosis of lung is a later result of repeated infection has led to a realization of the importance of keeping the bronchiectatic cavities empty. So long as they can be kept empty of pus—not an easy ideal to achieve—their mere existence is not a great handicap to health.

INTRATHORACIC TUBERCULOSIS

Tuberculous infection in childhood does not often present with the symptom of a chronic cough. More often there is a history of general ill-health, loss of weight, and night sweats. Sometimes there is the associated condition of erythema nodosum or phlyctenular conjunctivitis. The pulmonary physical signs of tuberculous lung infection are often miminal and the diagnosis may largely depend upon an x-ray which demonstrates the primary complex, enlarged hilar glands, or a pleural effusion; a raised blood sedimentation rate, a raised temperature at night, and a positive Mantoux reaction will help to confirm the diagnosis. If cough is a symptom it is seldom productive and is probably due to the enlarged parabronchial or paratracheal glands which form part of the primary tuberculous complex. Productive cough, the result of cavity formation, is rare in tuberculous pulmonary disease in childhood in this country. If there is a complaint of cough it is usually due to enlarged hilar glands. It is, however, worth while sending the products of gastric lavage to the laboratory for a search for tubercle bacilli to be carried out, although the diagnosis should not await or depend upon a positive result.

This seems to be an appropriate moment to emphasize an important point which should arise in the practitioner's mind when discussing with parents the cause of their child's chronic cough. It should be clear that there are many causes of chronic cough in childhood and that tuberculosis is not one of the common causes. Yet the fear of tuberculosis is almost invariably present in the mind of the modern, semi-informed, newspaper-reading parent. It therefore behoves the practitioner, after determining the cause of the cough to be non-tuberculous, to tell the anxious parent so in unmistakable terms. It is remarkable how often anxiety can be allayed and a forward-looking attitude of cooperation induced in parents when it can truthfully be said 'And this is *not* tuberculosis'.

BRONCHIAL SPASM

By interfering with the normal flow of the bronchial secretions, spasm can cause a chronic cough in childhood. It can also predispose to bronchial obstruction and its sequelæ. The presence of bronchial spasm will be diagnosed by the hearing of constant high-pitched rhonchi on auscultation. When there is a history of allergic disease in the family and a history of infantile eczema or food allergy in the first year of life, the gloomy presumption that the child is a true allergic asthmatic is probably justified. In many cases, however, the bronchial spasm is the result of infection, and the search for, and treatment of, a focus in the upper respiratory tract is attended by good results.

HABIT

A chronic, non-productive cough is one of the more common habits or tics encountered in children. Like all tics the cough has its origin as a useful, or at any rate voluntary, action. The cause of its persistence is variable; sometimes it seems to be retained, just below the level of full consciousness, as a method of attracting attention, and in this it is usually highly successful; for a constantly repeated coughing tic can be extremely irritating to those who have to hear it. The child who develops such a tic is not unintelligent; he is often described as 'highly strung'. The tic itself does not worry him, but the irritation which it causes his parents, and their constant rebukes, may be a source of conscious distress to him.

Sometimes such a habit spasm will result in a child becoming conspicuous in school and the butt of his schoolfellows' ragging. This may result in the child's embarrassment and yet prolong the tic. A problem may then arise which will require the tactful and understanding handling of doctor, parent and schoolteacher. I have even heard of cases in which the help of a psychiatrist has been invoked.

TREATMENT

From what has been said of the number of possible causes of a chronic cough in childhood, and of their sequelæ if left untreated, it will be seen that treatment cannot be summarized in a few words.

The importance of treating acute respiratory infections early and vigorously should not need emphasis, for in many cases it is the neglect of the acute phase which results in chronicity. It is in some respects a counsel of perfection—and in other respects a waste of time—to undertake a bacteriological investigation of all such cases. Life is too crowded to permit of the bacteriological typing of all cases of acute tonsillitis, and many cases of acute rhinitis will be found to be untypable. Still, the effective and intelligent use of antibiotics does depend upon a knowledge of the sensitivity of the causal organism, and in cases in which routine treatment does not achieve a quick result, swabbing of the nose and throat should be carried out.

When the fact of chronic infection of the upper respiratory tract has been established, surgical removal of tonsils and adenoids should be undertaken. By this operation not only are the sites of chronic infection removed, but free drainage of the middle ear and paranasal sinuses is established. If the child has acquired the habit of mouth breathing as a result of nasal obstruction by hypertrophied adenoids, it is important to institute nose-breathing exercises after operation. The child will not drop a well-established habit of mouth breathing unless he is taught to use his new nasal airway. Similarly, the jaded appetite of the child with no sense of smell may well have become a habit of 'picking at his food', and this will need special attention. Probably the best results are attained by arranging for a complete change of environment after operation, and this may be provided by a seaside holiday or convalescence where breathing exercises can be taught.

Chronic infection of the paranasal sinuses offers a much more difficult problem of treatment. Radical surgical procedures have proved disappointing even to those most expert in carrying them out; antrum washouts, with or without the instillation of antibiotics, and attention to the child's general health, seem to attain better results than operations which radically alter the normal drainage, and sometimes impair it.

In those cases in which *obstruction of a bronchus* has occurred and x-rays show segmental collapse, active treatment is needed to shift the block and to prevent infection of the collapsed areas of lung. If x-rays indicate that the bronchial obstruction is largely due to enlargement of hilar glands the question of tuberculosis must be settled. A Mantoux test is useful, and in cases in which there is tuberculous granulation tissue in the bronchial lumen, there may be tubercle bacilli in the sputum.

In those cases in which the bronchial obstruction is caused by a plug of muco-pus, a form of treatment which is usually effective is to tip the child so as to promote drainage by gravity, and to administer firm thumping massage to the chest wall while the patient is in the tipped position. At first the head-down position can only be tolerated for a short time, five or ten minutes; but it is surprising how soon children will remain happily 'upside down' for hours continuously, so long as the position allows them to play or read. Such postural drainage and massage should be continued for two or three weeks in the hope that the bronchial obstruction will shift. Expectorants may be given with a view to rendering sputum less viscid, but their effectiveness is very doubtful. During the continuance of the bronchial obstruction and collapse of lung it is a wise precaution to give a prophylactic antibiotic, in the hope of preventing a pneumonitis in the collapsed portion of lung.

If after two or three weeks of such treatment the bronchial blockage continues, removal of the plug by suction through a bronchoscope and bronchial catheter will have to be undertaken if bronchiectasis is to be avoided.

In those cases in which the child first comes under observation with a cough caused by *bronchiectasis*, the treatment must depend upon the extent of the bronchial damage. This can only be assessed accurately by means of a series of bronchograms. The physical signs over the bronchiectatic areas are very variable, depending upon whether the affected areas of lung are filling with air or are collapsed at the time of examination. Lipiodol bronchography is therefore essential, and more than one such examination may be needed before all the lobes of both lungs have been surveyed and the extent and sites of the disease determined.

This having been done, it will in most cases be advisable to embark on a programme of postural drainage as already described. The daily output of sputum should be measured, as the effectiveness of treatment can be roughly judged in part by this. The posture assumed by the child will have to be varied appropriately according to the lobe or lobes affected. If the course of such treatment is interrupted by episodes of bronchial blockage, sucking out through the bronchoscope may be needed.

The success of the treatment will be judged by the diminishing quantity of purulent sputum which drains daily, and by the general improvement in health, the absence of fever, and the abatement of cough. The treatment is best carried out in 'long-stay' hospitals where the child can spend much time in the open air and where schooling can continue without serious interruption.

In most cases of established bronchiectasis a decision will eventually have to be made whether or not surgical removal of the affected areas of lung is possible and desirable. Where there is extensive damage spread through many lobes it may be considered that surgery is impossible. The more difficult decisions arise in those cases in which the disease is limited to one or two lobes but medical treatment has been, for the time being at any rate, successful. It is true that in the hands of a skilled thoracic surgeon lobectomy is not now a peculiarly hazardous operation and, when carried out in childhood, the results are very good. It is true, also, that medical treatment can only empty the bronchial tree of the infective material; it cannot remedy the tree's deformities. The child will still have bronchiectasis and will have to adopt postural drainage whenever even trivial respiratory infection threatens. Yet if home conditions are good and discipline such that this routine is accepted and acted on, the child may remain in good health. I recall the case of a boy who, at nine years of age, had well-marked saccular bronchiectasis confined to the right lower lobe, and who, at nineteen years of age, and still with bronchiectasis, rowed in his university crew. But in many instances it will be safer and more satisfactory to advise an operation for the radical removal of the affected lobes. Hypertrophy of the remaining lung tissue takes place in childhood, and the vital capacity and general respiratory efficiency, even after two lobes have been resected, return in time to something like normal.

Although chronic cough is not a common symptom of *tuberculosis* in childhood there will arise cases in which tuberculosis, especially tuberculosis of the hilar glands, is the true diagnosis. The treatment of tuberculosis in childhood is, as in older subjects, the treatment of the patient rather than of the lesion. Almost always treatment in hospital or sanatorium is preferable to treatment at home. The routine of rest, open air, nourishing diet appropriate to the pyrexial patient, and regular observation of temperature, weight and sedimentation rate, is not a routine often easy to arrange in the home. When one considers in addition that the treatment will be prolonged over many months and that, as recovery proceeds, the child will need schooling and amusing and carefully regulated exercise, it is clear that hospital treatment should be advised in most cases from the start.

The chief difficulty which arises in practice is the selection of cases for such treatment as has been indicated above. It is certain that many children acquire a primary tuberculous infection and overcome it with no symptom more serious than a few days 'off-colour'. It would be a serious injustice to such children to label them as 'tuberculous' and put them in hospital for weeks or months. When, however, a chronic cough can be shown to have its cause in a tuberculous infection, such thorough treatment is certainly indicated.

Another question which arises is that of the place of streptomycin and isonicotinic acid hydrazide in the treatment of localized tuberculous disease in childhood. Perhaps it is too early to be dogmatic about the second drug. Experience of both the benefits and dangers of streptomycin in miliary disease and in meningitis is sufficient to give rise to hesitation in its routine use in the more simple cases of localized primary infection. Probably the best practical course is to reserve the antibiotics for use in cases in which the ordinary measures of rest, diet, fresh air and added vitamins do not result in obvious and progressive benefit.

SUMMARY

The problem of the child with a chronic cough is one which arises frequently in practice. There is probably no one more common symptom in the school child than persistent cough. The problem is primarily one of correct diagnosis for, as I have tried to indicate, the possible causes are many. The importance of a correct diagnosis has been stressed because in some cases the cough may be the symptom of serious and progressive disease. Diagnostic procedures have been described which may put the patient, his parents and his doctor to some trouble; they should not be shirked on that account.

In the matter of treatment, stress has been laid on the importance of treating the patient and the cause and not the symptom itself.

THE PREVENTION OF RESPIRATORY INFECTION IN A CLOSED COMMUNITY

By T. A. A. HUNTER, M.B., M.R.C.P.
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THE physician who deals with respiratory disorder in the individual patient is concerned primarily with the lungs and bronchial tubes and his interest is mainly in diagnosis and treatment. The medical officer of an institution, on the other hand, is enabled through his special relationship with his patients to direct his efforts more towards prevention, and his main focus of attention also shifts to the upper respiratory passages and the diseases that affect them. There are several reasons for this shift. In the first place this is the portal of entry for most infective bronchial and pulmonary disease, and effective control of upper respiratory infections will materially reduce the incidence of deeper-seated respiratory disorder. Secondly, although to the individual most upper respiratory infections are little more than inconveniences, in a community they are the main cause of loss of working time. In a typical boys' boarding school these diseases account for about one-third of the total annual boy-days spent in the sanatorium. Thirdly, these maladies are generally highly transmissible, and in face of transmissible disease a closed community has its own advantages and disadvantages. On the one hand, it may be possible to limit the introduction of infection but, on the other hand, infection once introduced is likely to find conditions favourable for rapid spread. It should be remembered that except under experimental conditions communities are only relatively closed, and this fact tends to open the door for extraneous infection while leaving unaffected the tendency for internal spread.

The diagnosis and treatment of upper respiratory diseases rarely present difficult problems and, as I have already said, they are seldom of much consequence to the individual patient. The medical officer therefore concentrates on reducing their incidence in the community under his charge, and his approach is the classical approach to the prevention of infective disease. He directs his efforts on three points of attack: the reservoir of infection, the means of transmission, and the potential victim. In doing so he is handicapped by the many gaps in our knowledge of this relatively neglected group of infections, but none the less, a methodical policy based on these principles will show results in reduced loss of working time in his community.

THE RESERVOIR OF INFECTION

The bacteriology of upper respiratory infection is far from being fully understood. Cases are rarely treated in convenient touch with a laboratory, and the complicated and time-consuming techniques required for the

effective study of virus infections seem out of proportion in a disease which is self-limited and trivial in its effects on the individual. From the community point of view, however, the balance sheet is a very different one and there is here undoubtedly a fruitful field for research. Pending more exact knowledge it may be assumed that the chief infecting organisms are filtrable viruses and certain of the cocci, and that the reservoir of infection is a human one, either from actual sufferers or from healthy carriers. About the latter not enough is known for practical action. Mass swabbing and serological studies have their place in the control of a specific epidemic, but they are not suitable for general employment as part of the community routine.

The practical policy therefore aims at excluding extraneous, and isolating domestic, sufferers from the community. In both cases a compromise must generally be reached between the theoretical ideal and practical convenience. In the former case the degree of closure of the community can be relaxed or tightened according to the general prevalence of respiratory infections, and expected visitors can be instructed in the transmissibility of the ambulant common cold and its possible far-reaching effects on a community. This may seem self-evident, but it is almost completely ignored by the general public.

In the community itself the policy is one of education. Individuals are taught to regard their minor infections from a community and not from a personal point of view and to report them immediately. Isolation for twenty-four hours, in bed, will both hasten the cure of the individual and vastly limit the spread in the community. Incomplete though these measures may be, their demonstrable effects on sickness rates are sufficiently convincing to secure the active support of lay authority in their application.

THE MEANS OF TRANSMISSION

It seems reasonably certain that upper respiratory infection is mainly airborne, and that it is spread by direct *droplet transference* from person to person or by infective dust. In most communities the ordinary routine is such that any attempt at effectively segregating various sections involves so much disruption that it is impracticable. Prevention of droplet spread therefore limits itself to ensuring the best possible ventilation of, and spacing in, working, living and particularly sleeping accommodation. Few communities are housed in buildings that are ideally designed from this point of view or have access to the considerable funds which may be required for effective reconstruction. Nevertheless, cooperation between the lay staff and the medical officer will lead to a code of practice which will secure tolerable standards in the use of even the most unpromising premises. Air sterilization by chemical aerosols or by ultra-violet light is a practical possibility, but in my view it is unnecessary in most institutions under ordinary conditions; it may have a valuable part to play when a

particularly dangerous infection is prevalent or when the community is particularly susceptible.

Infected dust particles are increasingly thought to be an important factor in the spread of air-borne disease. In some cases, too, they appear to retain their infectivity for an appreciable time. Dust control is therefore an important preventive measure. Dry sweeping should be strictly forbidden, and regular cleaning should be carried out by suction cleaners and damped dusters. The equipment and decoration of rooms should be such as to avoid surfaces and corners which collect dust and interfere with its easy removal. Where the floors are wooden, considerable advantage can be obtained by regular oiling with spindle oil or one of the æsthetically more satisfactory proprietary substances that are now on the market for this purpose.

Special attention to *air hygiene* must be paid in sleeping quarters. Bed-making is a dusty and, nowadays, often a community occupation. Blankets are the main source of this dust. Their tendency in this direction can be reduced considerably by oiling. This process can be carried out as a part of ordinary laundering and it in no way affects the appearance, texture or life of the blanket. Alternatively, some alleviation can be had by the use of cotton blanket covers. In times of epidemic prevalence it is even worth while insisting on the wearing of masks by bed-makers. The whole subject of air hygiene is authoritatively dealt with in the Medical Research Council's Special Report No. 262, 1948, and this is worthy of the attention of all medical officers in charge of communities.

Although air transmission accounts for the greater part of the spread of upper respiratory infection other possibilities cannot entirely be neglected. Handkerchiefs and bedclothes must become infected and it is far from certain how long they retain this infectivity. It is therefore well to confirm that the laundering technique employed is such as to ensure sterilization either by heat or by chemical means. Again, with certain organisms and under certain conditions food and eating utensils may play a part in the transmission of these diseases. Only the highest standards of food and pantry hygiene can therefore be accepted by the conscientious medical officer.

THE POTENTIAL VICTIM

We are dealing not with a specific disease entity but with a group of infections of various and often unknown causation, and of imperfectly understood immunology. It would indeed be surprising if specific protective procedures using vaccines or sera played any appreciable part in such circumstances. Contrary opinions to this are often firmly held by individuals, both lay and professional, but they are invariably based on clinical impression and not on scientific evidence. All large-scale studies of protective inoculations against upper respiratory infections *in general* have consistently given negative results.

Protection of the individual is therefore limited to general measures. Of these, proper nutrition is probably the most important. Personal experi-

ence suggests that protein and vitamin C are the dietary constitutents that play the leading protective rôle: 70 g. of protein and 75 mg. of vitamin C are suggested as minimum daily requirements. Under present-day conditions considerable difficulty may be experienced in securing these intakes, particularly in the late winter when infection is especially prevalent. They can certainly never be taken for granted and their maintenance is an important preventive duty of the institutional medical officer. In the case of the vitamin requirement during this season of the year I have found resort to synthetic sources both practically convenient and economically desirable.

Chilling of the body, damp clothes and similar environmental conditions are widely held to be important precipitating factors in the development of respiratory infection. They can only act by lowering the resistance of the body to a concurrently present organism, and their mode of action in this way is by no means certain. It seems unlikely that they can affect the humoral protective mechanisms of the body, and they probably act by causing nasopharyngeal congestion and so facilitating penetration by the surface pathogens of the mucosa. This is borne out by the observation that differential, and not uniform, chilling appears to be the significant factor. Almost any degree of exposure seems to be tolerated out of doors provided that a change of clothes and thorough warming up are undertaken before sitting about in a stuffy room. Here again is a field for exact inquiry in the hope of reducing popular superstition to scientific fact.

Prophylactic sterilization of the upper respiratory tract by gargles, sprays, inhalations and lozenges is a method that has had many adherents. Considering the labyrinthine nature and extent of the passages it is extremely unlikely that any such method will produce more than a local and evanescent effect. Any possible benefit from this will generally be overweighed by the concurrent damage done to delicate mucous membranes by the solutions and vapours that are used.

Chemoprophylaxis is an attractive dream but as yet its practicability is very limited in this field, and until we have an antibiotic effective against viruses it seems likely to remain so. At present it has, in my view, two applications. In primary streptococcal epidemics the general use of a specifically tested chemotherapeutic agent is valuable as a means of limiting spread. Secondly, the routine use of sulphonamides in the treatment of all upper respiratory infections, although rarely affecting the course of the primary condition, seems greatly to reduce the incidence of secondary coccal complications. I am aware of the reputed danger of producing thereby resistant strains but in an extensive use of the method I have seen no evidence that this commonly happens. In any event, there are sufficient alternatives available nowadays to deal with the occasional case in which such a result is produced.

In this context it is desirable to mention the prevention of the spread of simple upper respiratory tract infections to the bronchi, lungs, nasal

sinuses and middle ear. This problem, though important, is not special to the closed community except in so far as the correction of chronic disorders of the organs in question is more easily carried out when a population is under continuous rather than episodic medical care. The detection and treatment of such abnormalities is an integral part of the prevention of respiratory disease in institutions.

PULMONARY TUBERCULOSIS

No discussion of respiratory disease in a closed community would be complete without a consideration of pulmonary tuberculosis. Particularly is this the case when the community is one of adolescents or young adults. The general principles involved are precisely those that we have already discussed. Their application becomes specialized because of the difficulty involved in picking out both potential sources of infection and the resulting victims. Infective adult tuberculosis can be a very silent disease, and all new adult entrants to a closed community of adolescents should be carefully examined, both clinically and radiologically, to exclude this disease. Ideally this examination should be repeated at yearly intervals, though in practice this can be omitted provided that the system of health supervision is adequate.

The primary tuberculous infection is also an affair that is evanescent and difficult to diagnose. None the less, the incidence of many primaries in an adolescent community is an index of a source of infection and important to detect. The routine use of skin tests is the most practicable probe here. All new entrants should be tested and non-reactors retested yearly. A high conversion rate is the signal for an exhaustive investigation in the community. It would be out of place in this article to discuss the use of B.C.G., but this debatable subject must be of critical interest to all institutional medical officers. It is to be hoped that the results of current controlled investigations will give unequivocal guidance in the matter.

CONCLUSION

It is apparent that the control of respiratory disease in a closed community is a complex matter. There is no simple formula that will secure it. It is rather a question of continual vigilance and the application of well-known hygienic principles in almost every field of the community's activities. The results by which success can be measured are not dramatic. Not many lives will be saved or serious illnesses averted. The individual members of the community may be scarcely aware of the problem. It is in the increased productivity and well-being of the community as a whole that the medical officer will find his reward. Of all his activities this is possibly the most important and it is certainly among the most exacting. Furthermore, upper respiratory disease is no monopoly of closed communities. In the population as a whole it is one of the most important causes of loss of efficiency.

COLDS AS A DIAGNOSTIC PROBLEM

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LARGE-SCALE research over a long period of time is providing some answers to both the prevention and treatment of colds that controvert the usual pessimistic reports that treatment is of little value in this most common of all afflictions. From the experience gained in the Student Health Service at the University of California, Berkeley, during the 25 years the research has been in progress, there is clear indication that the much disparaged remedies have real value if intelligently *combined*, *after* careful estimation of the individual problems of each patient. Prolonged observation does bear out the accepted belief that none of the remedies, from vaccines to vitamins, aspirin to penicillin, antibiotics to psychotherapy, is one hundred per cent. effective *alone* in preventing or stopping all colds. Full consideration of the many types of colds, the zoological variations in human defence capacity, and the many hygienic factors which influence the hereditary defence mechanisms, indicate conclusively that no remedy can be completely effective for every cold.

Review of the many remedies, classified as worthless because none of them cures all colds, and adopting the attitude of searching for perhaps a little value which can be utilized effectively in combination with other therapeutic procedures to prevent or stop colds, has brought to light successful means to prevent or stop most colds. At the same time, it has become apparent that the clinician, in order to benefit from this knowledge, will have to approach the problems of both the prevention and treatment of colds in a manner far different from the usual routine 'same-for-all, no-preliminary-investigation treatment'. Most important of all, he will have to individualize.

TYPES OF COLDS

The greatest obstacle to the scientific treatment of colds is the simple fact that the clinician rarely knows what he is facing in treating a cold. Still without a quick method for identification of virus colds, he has become lax about culturing for bacterial colds. He makes a smear and waits for a culture report only when diphtheria is suspected, or the cold is particularly severe. Since the newer remedies are more effective for one group of infections than for another, it has become increasingly important to identify the invader before starting treatment. Great advances in the identification of virus infections lead to the hope that soon we may have a quick means of knowing whether the parasite responsible for the prevailing cold is actually a virus, is perhaps bacterial, or is one of the less common types.

Still in the realm of conjecture, there is much insistence that the common cold is due to a small virus for which there are no effective remedies. Acceptance of this unproved idea by the practitioner places him in the

present-day disgraceful do-nothing position of admitting defeat, of being open to criticism by the public, even to lawsuit by patients who have been permitted to endure the discomfort of an unnecessarily prolonged illness with serious loss of time from work, damage to hearing apparatus or sinus membranes from unchecked extension of the cold, or even death from pneumonia.

The practitioner is in a far better position to treat colds successfully if he keeps in mind all known causes for the set of symptoms in the respiratory tract that result from automatic efforts to cast out the invader of whatsoever variety. The excellent work of many investigators (Dochez, Andrewes, Topping, Foster, and others) has demonstrated conclusively that there is a great group of virus colds, and that members of the group may be the principal cause or causes of ever-recurring worldwide epidemics. Whether we shall separate off the known virus colds such as type A and B influenza, measles, encephalitis, poliomyelitis, or infectious mononucleosis, from the unknown types is a quibble, ultimately to be settled by identification of the present unknowns.

Broad research into different types of infection that may produce the symptoms of a cold in the human respiratory tract show that bacterial colds are more prevalent than we have been led to believe. The practitioner becomes aware of this when the supposed virus cold confronting him turns out to be early tuberculosis, whooping-cough, pneumococcal pneumonia, diphtheria, Vincent's angina, scarlet fever, a quinsy, or even meningitis. Also there is a group of chiefly streptococcal, or staphylococcal, colds considered as 'let in' by a preceding virus infection, although strains have been demonstrated virulent enough to invade the human body without any such aid. Less common infectious colds among the 55 types studied so far on the Student Health Service are spirillal, spirochætal, rickettsial, fungus, protozoal, and metazoal colds.

Beyond infectious colds, and producing identical symptoms at onset, there is the enormous group of irritations produced by pollens, emanations, and the like. Recognition of hay fever and asthma, alone, or associated with infections, is essential for success in the treatment of colds.

TYPES OF HUMAN BEINGS

The second great bar to the scientific treatment of colds, a situation long needing remedy, has been universal disregard for zoological variations in human beings—specifically the variations in defence capacity against the group of parasites that cause infectious colds. Widespread attempts to immunize or otherwise treat large groups without preliminary study of their individual problems have choked the literature with countless adverse reports, all perfect proof of the failure of a rigid same-dosage-for-all treatment applied to human beings who vary from perfect automatic defence down to no defence.

Curiously enough, the opportunity for more successful prevention and

treatment of colds offered by individual treatment following preliminary estimation of good, average, or poor defence capacity, was brought to light by study of the rare individual who has *perfect natural resistance to infections*. Nine of these, who had never had a cold or any infection during the eighteen years preceding entrance to the University, caught attention during the compulsory entrance physical examination of approximately 60,000 students during the first 15 years of this study. Since all had come up through the public schools, enduring the same excessive exposure to infections as was striking down their less well-endowed companions in our crowded school rooms, the perfection of their natural resistance mechanisms was evident. Review of a group of 3,250 students upon whom the usual immunization by means of bacterial vaccine had been attempted, without preliminary study of their exact needs, disclosed that a number of the perfect natural resistance individuals had taken the treatment because it was offered free. They were not going to have any colds anyway, and did not during the observation period, and their favourable reports vitiated the final conclusions as to the worth of bacterial vaccines in preventing colds.

Ferreting out the *poor natural resistance* individuals, in the group of 3,250 tested with same-for-all dosage of cold vaccine, it was found that these were the 25 per cent., or more, of reported failures. Successfully re-treating them individually with larger doses and more prolonged courses of vaccine, plus indicated supportive measures, it became apparent that the usual routine course of vaccine is not sufficient to protect the poor natural resistance group, but does not warrant the usual conclusion that vaccines, or vitamins, or any other therapeutic test, are valueless.

Since better results are produced by increasing the amounts and the duration of treatment as we approach the poor natural resistance end of the list, a preliminary estimate of whether each individual has good, average, or poor defence against colds is essential to effective planned treatment. History of past experience with infections, especially colds, supplies the clue. Thus, in a random group of 2,375 students, the great majority, 1,256, were found to have experienced during their first eighteen years of life, measles, mumps, whooping-cough, chickenpox, and usually one serious infection such as scarlet fever, diphtheria, or influenza. They averaged 0 to 3 colds a year, and being the majority group, were classified as having *average natural resistance*.

On the better side, some 470 students were found in eighteen years to have experienced less than the average number of infections, perhaps only measles, or mumps, and to have had many years with no colds, or perhaps one or two very slight colds a year, lasting only a day or two, with never any extension to the ears, sinuses, or lungs. These were classified as good to excellent natural resistance.

On the poor side, a group of 649 were found to have had an unusual number of infections, including colds. Not only had there been a wide variety of infections, but they reported influenza every time it came around,

measles several times, repeated complications of colds from ear abscess, mastoiditis, devastating sinusitis to pneumonias. Indicating their poor defence they had every cold that went through the community, rarely being free of infection for longer than two or three weeks at a time, and averaging as many as 10 to 15 infectious colds a year.

Such wide differences in defence capacity made it plain why individualization of dosage and length of treatment produced better results than routine same-for-all procedures.

COLDS AS A DIAGNOSTIC PROBLEM

In the process of classifying patients as to good, average, or poor natural resistance on the basis of past experience with infections, many were found temporarily in a group lower than expectation from early indications. Gradually it became evident that many factors which depress resistance to infections must be considered in planning freedom from colds: fourteen have been studied to date, with more to come. The discovery that various combinations and occasionally all the factors were preventing success from routine treatment led to planned regimens, including attention to every factor depressing the patient's resistance. A brief resumé will clarify how each factor may be affecting the patient to some extent, often enough to prevent freedom from colds as long as it is ignored:—

Underlying chronic infection.—Study of the failures in our group of 3,250 students given a routine course of mixed bacterial cold vaccine, the usual no-preliminary-examination, same-dosage-for-all, placebo control group, considered sure-fire for determining the worth of any therapeutic measure, disclosed among other doubt-inspiring features, that some of the individuals had a smouldering chronic tuberculosis affecting their resistance to prevalent acute respiratory infections. Others had osteomyelitis, or syphilis, and all showed better resistance to colds when their underlying chronic infections were finally recognized, cleared up, or at least rendered quiescent.

Infected tonsils.—Study of 2,680 students who had had their tonsils out between two and eighteen years of age disclosed that only 7 per cent. had been benefited, whilst 93 per cent. had just as many colds and sore throats, or more. Tremendous improvement following tonsillectomy when the faucial tonsils had taken up more infection than they could handle, had become abscessed, or were passing toxins and infection into the body, proved that great benefit results from tonsillectomy when definitely indicated. Indiscriminate removal of tonsils because brother or sister was having his or hers out, or because they 'look bad', or due to misjudgment when some other unrecognized cause is making the patient subject to colds, most certainly did not benefit the patient.

Abnormalities in the nose, sinuses, and bronchial tree.—A group of 2,667 students studied solely from the standpoint of the relation of local abnormalities in the nose, sinuses, and bronchi to susceptibility to colds and chronic infection, disclosed 44 per cent. with situations requiring decision

regarding treatment. With the invaluable aid of the nose and throat specialist, it was discovered that the good natural resistance group, in spite of completely obstructing septums, or the entire nasal apparatus mauled by old fractures, did not show any local infection and had no colds. Their exceptional automatic defence prevented invaders from colonizing in spite of the unusual opportunity. These needed no local or general treatment.

The average natural resistance group were benefited sometimes by local treatment, sometimes by general measures alone, or by a combination of both. Close collaboration and a conservative approach paid handsome dividends in this group. The poor resistance group responded to nothing less than extensive specialized treatment; even so they were not entirely relieved of colds and chronic sinusitis unless all indicated general measures were included in each regimen.

Allergy.—Study of 2,380 students from the allergy standpoint alone disclosed 33 per cent. with definite allergy or a family history demanding consideration of this factor in their susceptibility to colds. Essential for successful treatment was differentiation between hay fever colds and infectious colds, and in particular to recognize the situation when both allergy and poor natural resistance to infections are present in the same individual. Both must be treated. Collaboration with the allergist, and the nose and throat specialist is essential in this group. Nowhere else is failure more likely from either one of the three 'hogging' the patient.

Hypothyroidism.—All susceptibles to colds should have a basal metabolic rate estimation. The slow pulse, quick chilling, and easy fatigability of this group suggested, among other defects, that they were hypothyroid. Although the literature gives little attention to this factor, administration of appropriate doses of thyroid extract improved defence against colds remarkably. Discontinuance brought back the same old susceptibility.

DIET

General dietary deficiency.—As measured by recognized standards for quality, freshness, and completeness of diet, not one of the students could be said to have a perfect diet. All had given up foraging for food; living in the city, they depended upon canned, preserved, refrigerated, not-fresh foods. Many were on very incomplete diets, whilst some, working their way on one meal a day, displayed extremes of poor condition with emaciation, anæmia, and even scurvy and beri-beri. Execrable physical condition made little difference in regard to colds if the individual was in the good natural resistance group. The average and poor natural resistance groups, however, suffered more colds when on a deficient diet, and had better resistance when the diet was improved.

High quality proteins.—Better results with vaccines and with care of acute colds resulted from *careful inclusion* of high quality proteins in the diet, adhering to the observation of Cannon (and others) that antibodies do not form in the absence of a complete set of amino-acids.

Vitamins.—Definite evidence of the value of vitamin A was found in occasional individuals subject to colds who had complete freedom year after year (14 years now is the longest observed) so long as they took 25,000 to 50,000 units daily. The experimental work on the relation of vitamin A to the lining of the respiratory tract should not be ignored. With due regard for the many other factors which influence defence against colds, vitamin A should have a place in the defence regimen of at least the average and poor natural resistance groups.

SOME PREDISPOSING FACTORS

Fatigue.—Chronic fatigue, with acute fatigue superimposed at examination, big-game, senior-week, and such times is characteristic of students. Rest in the daytime was a rarity, and most were adapting to a high-paced routine under nerve strain, ignoring fatigue sensations, and gradually cutting sleep to an average of six hours or less. These exceptional conditions for observing the effects of fatigue disclosed that the good natural resistance group had no colds though constantly worn down and in dreadful physical condition. Many in the average natural resistance group, and all in the poor natural resistance groups, reported colds after extra fatigue. All did better when rest was fought for.

Chilling.—Of no importance when agents of infectious colds are absent from the nose and throat, and in those who can 'take it', chilling becomes a life and death matter for susceptibles in crowded city areas under the trio of: (a) frequent contamination providing an infection always ready to invade; (b) chilling, driving the blood with its antibodies and corpuscles away from the nose and throat (Mudd, *et al.*); (c) the body-heat-regulating mechanism out of order due to atrophied skin from covering it with heavy clothes and living in heated quarters.

Deficient, infected, and poisonous air.—Although exposed to vitiated air, deficient in oxygen, carrying an excess of CO_2, dust, carbon monoxide and other poisonous gases, contamination by the infections in class-room, social-hall and business establishment air proved to be the most dangerous. Would that the work of Andrewes (especially with the little fluorescin bag) could become sufficiently known to dispel the dense ignorance regarding how colds spread about. Lethal for the susceptible, bringing the cold of the moment to the average group, and occasionally dragging down the good natural resistance individual, class-room and similar air has much to do with colds.

Deficient sunlight.—The occasional individual who has no colds so long as a daily sun-bath is taken, or a sun-lamp is used assiduously, with return of colds if this single rite is omitted, makes it impossible to discount sunlight entirely. Addition of sun-bathing to the extensive regimen of the extremely susceptible has proved the deciding factor in gaining freedom from colds.

'Reasonable' asepsis in everyday life.—Cutting the number of contaminations per day to what the individual defence mechanism can handle may

be termed 'reasonable' asepsis. The perfect natural resistance individual can accept all the spit and sewage in the world in his mouth and nothing will happen. The average natural resistance individual has to wash his hands before eating, avoid letting others talk at close range into his face or food, and be careful of eating utensils. The susceptible to colds has to do still more: avoid public gatherings, stay out of restaurants, and spend much time out in the open.

THE VALUE OF VACCINES

Vaccines to improve antibody defence.—Tremendous value was discovered in vaccines, especially the much disparaged mixed bacterial cold vaccines, by recognizing that their only virtue is in improving antibody defence, that they must be handled so as not to be inert when finally administered, and particularly by getting away from routine dosage, especially increasing the dosage and length of treatment in susceptibles to colds.

Vaccines cannot remedy an obstructing septum, an allergic reaction, hypothyroidism, deficiency in diet, rest, pure air, or sunshine. Persistence with vaccine treatment (two or three years even) brings many a failure into the success group. On rare occasions an intense allergy forces resort to other measures.

The only way to discover whether the factors already mentioned are affecting the patient's capacity to fend off colds is to take a complete history, make a physical examination, do laboratory tests, take x-rays, and obtain consultants' (nose and throat, allergy, lung, dental) opinions. Hence the plea that the tough problem of colds be accorded the same diagnostic procedure as a cardiac, gastro-intestinal, renal, or other medical case.

IDEALS OF TREATMENT

Prevention of colds is the great objective. No colds, year in and year out is the goal. Since very few have automatic defences good enough to keep out all colds, exertion of the wits to improve defences or avoid unnecessary contamination is necessary for the vast majority of human beings, if they would be free of colds. The weaker the automatic defences, the greater must be the conscious effort. The physician, by preliminary survey, frequent review, and gradual application of one, several, or all of the known means of improving defences against colds, can educate and train each patient to the point of success.

Because the task is not a simple one, neither physician nor patient should be discouraged if a perfect result is not obtained immediately, especially in the case of the susceptible. The preliminary survey often discloses need for drastic change in living and working habits, which may be impossible to accomplish at first. Clearing up local conditions, perhaps tonsil or nose operations, and prolonged courses of vaccine or allergy treatment, may prevent immediate control of colds.

Basing prognosis on the estimated defence capacity of the individual, the

physician may assure the good and the average natural resistance groups that, once worked out, the individual's regimen will prevent all colds so long as it is followed. The poor natural resistance group, requiring constant and strenuous attention to many, often all, known defence measures at one and the same time, can be guaranteed great reduction in the number, severity, and duration of their colds; elimination of damaging otitis, mastoiditis, sinusitis, and pneumonia; relief from constant and prolonged interruption of school, social and business life, with its evil consequences in economic hardship, impaired physical condition and shortened life.

Since the susceptibles are the ones who catch everything, freshen up the virulence of each infection, and spread it to school, social, and business groups, thus being the source of epidemics, community interest is best served by recognition of these very poor natural resistance individuals, followed by training both to improve their own defences and to protect others from their infections.

Treatment of the acute cold will be needed in those still inept at applying their preventive regimen; in those who lapse in following a successful regimen; occasionally in the extreme susceptible because the required regimen is too complicated to follow successfully at all times, and because an occasional cold still comes along that defies all efforts at prevention.

Extensive administration of penicillin, sulphonamides, and the broad spectrum antibiotics has proved them more valuable than reported, if applied early (first day), instead of adhering to the widespread dictum to save these powerful remedies for serious complications in ears, mastoids, sinuses and lungs. Obviously it is easier to eradicate the invaders before they become firmly entrenched in the deeper tissues. Much smaller dosage and less prolonged treatment spare the 'early' patient toxic poisoning, cuts the prospect of sensitization rash, and urticaria, and makes 'fastness' a rarity.

Because we are in the dark as to the active invader, and hence cannot choose the remedy best able to eradicate the given infection, it has proved practical to combine two or three remedies covering the entire field of cold agents, and further to switch about if improvement is not immediate. Remembering that many of the old remedies aid the patient's defence, even if they add little by way of inhibiting the infection, there is real usefulness in rest, warm atmosphere, high calorie diet, antihistamines in allergic subjects, atropine to control excessive secretions, local decongestants, and even external applications.

CONCLUSION

By no means subscribing to the widespread pessimism regarding the treatment and prevention of colds, this report from the Student Health Service indicates the good results which can be obtained from a correct approach to the problem, especially preliminary survey of each individual with application of a regimen consisting of attention to all of the known factors which influence defence against colds.

DUPUYTREN'S CONTRACTURE

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Dupuytren was one of the most distinguished of the renowned school of French surgeons who were practising in Paris at the beginning of the nineteenth century. He described the type of contracture which has since borne his name, and offered an anatomical explanation of the clinical picture. Occasional references to the condition can be found in the medical writings of earlier times, but no one put forward a scientific thesis concerning its causation. Details have been added since Dupuytren's publication, but his classical paper (1834) remains unchallenged. The etiology of the condition still defies elucidation although several causative factors are known. Innumerable remedies have been suggested, ranging from radical surgery to hormone treatment and the application of salves.

ANATOMY

The condition is due to contraction of the palmar aponeurosis following the formation in it of fibrous tissue. The normal aponeurosis consists of a thin sheet of tissue which lines the palm, lying between the skin and the tendons. The digital nerves and vessels are also beneath it. It is attached above to the transverse carpal ligament, from which it fans out across the palm. As it approaches the fingers it collects into well-marked bands which are linked to each other with transverse fibres. A band passes down the flexor surface of each finger and a similar, though less well-marked, band down the thumb. These bands end over the middle phalanges of the fingers and the proximal phalanx of the thumb. None reaches the terminal phalanges. The bands are attached to the fibrous layer of the flexor tunnels and to the sides of the phalanges (fig. 1).

The chief function of the aponeurosis is to strengthen the skin of the palm and fingers against the wear and tear of holding and grasping. It also serves to preserve the concavity of the palm by preventing its soft tissues from rising like a ball when the fist is closed. Its attachments are designed to these ends. It is attached to the skin, to which it is subadjacent, by innumerable small strands, whilst its under-surface is tethered to the metacarpal bones by longitudinally directed septa. There is no attachment to the flexor tendons or their sheaths in the palm since these have to move freely beneath it. As the lumbrical muscles pass round the bones to reach the extensor tendons, however, a small prolongation is carried back from the under side of the aponeurosis along the lumbrical canals.

In Dupuytren's contracture the fibrous tissue which forms in the aponeurosis tends to grow out along its attachments. Extensions may therefore be

found in the skin at any point overlying the aponeurosis, or passing down from its under surface to the metacarpal bones or along the lumbrical canals. It is of the greatest importance that the surgeon be acquainted with the details of these attachments if recurrences are to be avoided after operation.

FIG. 1.—Palmar fascia separating into bands which run down the fingers as far as the middle phalanx and down the thumb to the proximal phalanx.

FIG. 2.—The effect of Dupuytren's contracture on the finger.

INCIDENCE AND ETIOLOGY

Incidence.—Accurate statistical evidence of the frequency with which Dupuytren's contracture occurs is not available since the condition is not notifiable to the Registrar-General's Office. Attempts have been made to reach a conclusion from examination of the hands of the inmates of workhouses and Poor Law institutions, and from surveys of the hands of patients in hospitals. Figures from institutions for the elderly are unreliable, since it is well known that the incidence of the condition increases with age. In some surveys of this kind as many as 20 per cent. of the male and 3 per cent. of the female inmates were found to be afflicted (Smith, 1884). Calculations based on examination of hospital patients are unreliable for several reasons: the numbers available are too small, social classes are disproportionately represented and, most important, the number of patients attracted to a particular hospital for treatment of this condition is influenced by the experience and interest of the staff in treating it. It is therefore best to draw no further conclusions from these investigations than to note that the incidence

is surprisingly high, and that the disease is much commoner in men than in women. Most figures show a ratio of approximately eight to one. Attempts have also been made by several workers to demonstrate statistically the rising incidence with age. These figures are more reliable and prove conclusively that although the disease can occur in youth, it is rare, whilst the frequency rises in each succeeding decade.

The *etiology* of the condition is unknown. An hereditary tendency is, however, discernible in some families, and on occasion an identical deformity is produced in succeeding generations. It is also widely held that the repeated trauma of heavy manual labour plays an important part; the high male sex incidence is quoted, perhaps rightly, in support of this contention. There is no doubt, however, that the condition often occurs in men who have never used their hands for hard work and in many patients whose forebears have never been afflicted. Increasing interest is being taken at the present time in the view (Skoog, 1948) that the clinical appearance of the contracture depends upon changes taking place in the connective tissue whereby the elasticity and fluid content of the fibrils is reduced and the subcutaneous fat reabsorbed. These changes are to some extent the normal accompaniments of advancing years, but they increase the chances of rupture of the fibrils, with resultant collagen formation.

CLINICAL PICTURE

The condition usually starts as a firm, tender band, palpable beneath the skin of the palm in the line of the fourth or fifth metacarpal bone. More rarely the band may be in relation to the other metacarpals or the condition may start as an isolated nodule. In these cases a longitudinally directed thickening soon appears. The process then spreads down one or more fingers, flexing the knuckle and the proximal (but not the distal) interphalangeal joints (fig. 2). The fifth is the finger most commonly involved. Extension of the affected fingers is found to be restricted and the limitation is progressive. By this time the area of thickening in the palm will have been greatly increased and the hand is crippled. It will be noted, however, that within the limitations imposed by the contracture the flexor and extensor tendons are working normally, being uninvolved in the process. Sooner or later secondary extensions occur from both surfaces of the aponeurosis. Tough, whitish lumps appear in the skin which becomes distorted, being heaped up and deeply furrowed. At the same time massive bands can be felt passing down to the bones. In the fingers these are readily palpable as they pass over the outer fibrous layer of the flexor sheaths to the periosteum and joint capsules. In a severe case the mass in the finger may be more than a centimetre in thickness.

Serious secondary damage ultimately occurs in the affected joints. The bones become subluxated and the exposed cartilaginous heads undergo arthritic changes, whilst the joint capsules become grossly contracted on their flexor aspects. With the passage of time adaptive shortening occurs in

the relaxed long flexor tendons owing to disuse. In many severe cases a curious thickening develops in the skin and subcutaneous tissues on the back of the knuckles and finger joints. These pads consist of fibrous tissue similar to that found in the aponeurosis.

DIFFERENTIAL DIAGNOSIS

Careful examination of the hand will reveal the clinical characteristics of the disease and there will be little difficulty in making the correct diagnosis. There are, however, other causes of contracture of the fingers with which Dupuytren's contracture can be confused on superficial examination.

FIG. 3.—*Volkmann's contracture.*—To show the ability to straighten the fingers when the contracted long flexor tendons are slackened by bending the wrist.

Volkmann's contracture.—This condition results from the replacement of the bellies of the long flexor muscles with fibrous tissue. It usually occurs after tight splinting with the elbow flexed following a fracture. The fibrous tissue in the muscles contracts, shortening and tightening the tendons, and so flexing the fingers. All the joints of the fingers are flexed since the flexor tendons extend to the terminal phalanges. This is different from the flexion in Dupuytren's contracture, in which the terminal joints are unaffected. If the pull is sufficiently strong the wrist may also start to be drawn down. The condition is readily diagnosed by noting that the fingers cannot be pulled straight unless the tendons are first relaxed by flexing the wrist. As the wrist is extended again the fingers resume their flexed position (fig. 3).

Ulnar nerve palsy.—The crooked position of the fourth and fifth fingers, with hyperextension of the metacarpo-phalangeal joints, which occurs with the '*main-en-griffe*' of ulnar palsy, may closely resemble the position assumed in Dupuytren's contracture. The two conditions are readily distinguished, however, by examining the tissues of the palm and flexor aspect of the fingers, and by testing for evidence of motor and sensory disturbances in the distribution of the ulnar nerve.

In ulnar lesions the skin of the palm and fingers is smooth, shiny, soft and atrophic. The hypothenar eminence and the fingers are wasted. The hard subcutaneous masses of scar tissue characteristic of Dupuytren's contracture are absent. Loss of sensation over the fifth and ulnar half of the fourth fingers, and the inability to use the interossei to adduct and abduct the fingers, clinch the diagnosis of a nerve palsy (fig. 4).

Congenital crooked finger.—This condition is usually bilateral and sym-

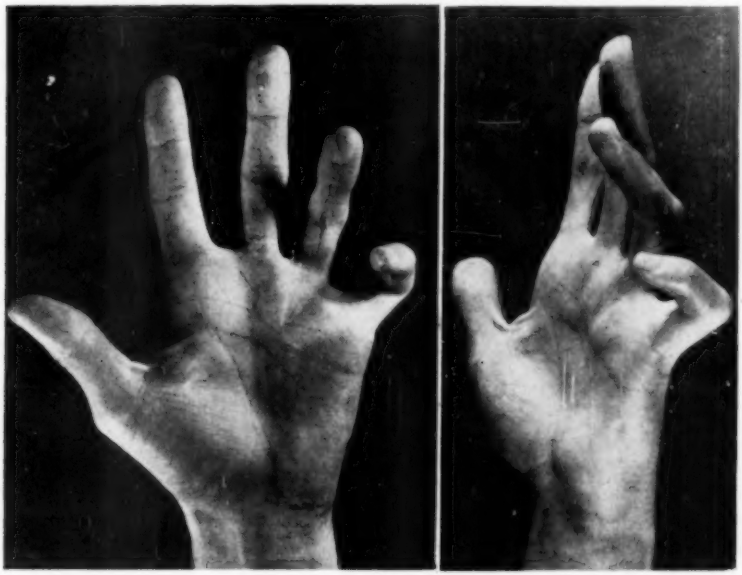

FIG. 4.—*Ulnar palsy.*—To show the *main-en-griffe*, wasting of hypothenar muscles and smooth atrophic skin.

metrical. It is confined to the little fingers, which are prevented from full extension by congenital underdevelopment of all the tissues on their flexor aspects, including the skin. On attempting extension the fingers assume an even curve reminiscent of lampoons of the dainty tea drinker. The metacarpo-phalangeal joints are little if at all involved. Examination of the fingers shows the skin and subcutaneous tissues on their flexor aspects to be normal in texture but tight, due to insufficiency of available material. There is neither the thickening of the deep tissues nor the corrugation of the skin found in Dupuytren's contracture. Attempts at surgical correction of congenital crooked fingers are unsuccessful since the flexor sheaths and capsular ligaments are underdeveloped, and because the bony surfaces of the joints have become adapted to the restriction of movement thereby imposed (fig. 5).

TREATMENT

There is no doubt that surgery is the most successful method of treating Dupuytren's contracture. Success implies the restoration of a full range of painless movement and freedom from recurrence. This can only be achieved by complete extirpation of the palmar aponeurosis and its extensions, meticulous care in dissection of the hand, and untiring attention to all the details of postoperative rehabilitation. With these premises, however, success can be guaranteed except when gross flexion of a joint has been

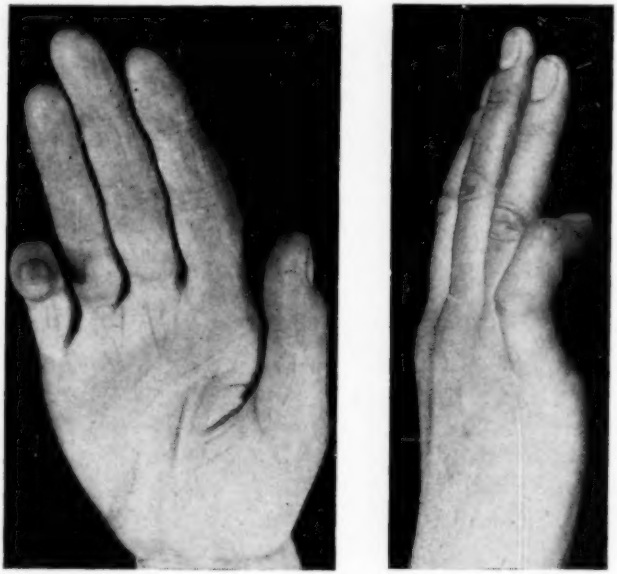

FIG. 5.—*Congenital crooked finger.*—To show the restriction of extension of the proximal and distal interphalangeal joints, without involvement of the metacarpo-phalangeal joint, which can be freely hyperextended. The palm and its underlying aponeurosis are also normal.

present so long that capsular shortening has been followed by subluxation and arthritis. In such circumstances, which are most likely to pertain to the proximal interphalangeal joint of the fifth finger, it may be impossible to restore full extension or to prevent some stiffness in that joint. Partial excisions of the aponeurosis are deprecated since recurrences are common, and subcutaneous tenotomy should be condemned, as recurrences are inevitable.

The operation, according to the technique recommended by McIndoe, consists of exposing the fascia through an incision across the palm and in each finger. It is performed under a tourniquet which enables the surgeon to preserve nerves and vessels without leaving any part of the aponeurosis,

including its deep extensions to the bones and along the lumbrical canals. If the skin is involved, it has to be removed and replaced with a thick, free skin graft. On completion of the operation the hand is enclosed in a bulky pressure dressing of wool to prevent the formation of a hæmatoma. Movement of the finger tips in this dressing is encouraged after three days. A smaller dressing is substituted after a week and the stitches are removed on the tenth day. The patient can leave hospital after about two weeks provided he can be kept under close supervision (fig. 6).

(a)

(b)

(c)

FIG. 6.—*Treatment of contracture* by total extirpation of aponeurosis in a man aged seventy. (a) Preoperative condition showing maximum extension of all fingers; (b and c) after operation.

The principles of *rehabilitation* are to encourage active movements during the day and to splint the fingers in extension at night. These postoperative measures are as important to success as the operation itself. Movement may be assisted at first by wax bath treatment if the patient experiences pain or is apprehensive. Passive movements are contraindicated and massage is needed only if œdema develops on the back of the hand when movement is begun. This occurs sometimes in severe cases, but is transitory. Encouragement in the performance of active movements is the principal rôle of the physiotherapist.

Extension splints should be worn at night in all cases for at least three months to oppose the normal tendency of the hand to assume the flexed position during sleep. Unless it is opposed for this length of time the patient

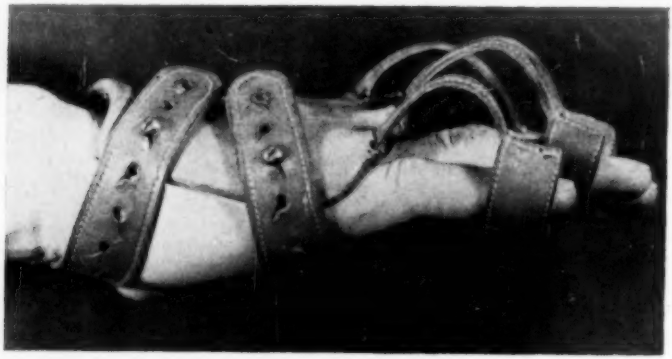

FIG. 7.—*Extension splint.*—Made of light metal and padded with sorbo, the splint is finished in leather. The metal hoops and thimbles pull the fingers straight and at the same time allow them to be actively flexed against resistance. The dorsal pad of the splint should come sufficiently far forward to protect the metacarpo-phalangeal joints from hyper-extension, and should not be carried so high that it interferes with dorsiflexion of the wrist.

may experience difficulty in getting the fingers quite straight after a night's rest. In cases in which there has been adaptive shortening of the long flexor tendons the splint will gradually stretch them until their full length is regained. This may take as long as six months. A splint made of spring extensions and finger thimbles enables the patient to use it as an exerciser if necessary during part of the day (fig. 7). It is impossible to overemphasize the importance of the correct use of the splint in assuring success.

It is unwise to operate on both hands at the same time since the operation is lengthy, and because the patient is then helpless postoperatively for ten days. It is best to wait at least a month for rehabilitation before operating on the second hand.

OTHER METHODS OF TREATMENT

Vitamin E.—The ingestion of this substance has been advocated by Thomson (1949) and others in the belief that it softens scar tissue and improves the range of function of the hand. It is, of course, impossible to prove or disprove this contention from clinical research without treating a very large series of cases. I have, however, had the opportunity of questioning a number of patients who have had this treatment, and of examining their hands. In none has there been an improvement and all have willingly subjected themselves to surgery. It is, of course, true that a surgeon is likely to see the failures rather than the successes of non-surgical measures, but there is widespread agreement that vitamin E has little if any effect on cases of any severity. The dosage recommended by Thomson is 'ephynal' (Roche), 200 mg. daily by mouth, for four to five months.

Exercise.—It seems probable that the rate of progress of contracture in an early case can be checked by stretching the affected fingers frequently every day. This passive movement can easily be carried out by the patient, and indeed few patients escape the formation of the habit of working the fingers unconsciously whenever the hands are free. Forcible stretching, however, causing rupture of further fibrils, may lead to rapid increase of contracture. This danger should be explained to the patient. It seems certain that exercise alone cannot materially improve a hand already contracted, and that there is a very real risk of making such deformities worse. It would be reasonable to advocate the ingestion of vitamin E when exercise is tried as a palliative measure in an early case.

X-ray therapy.—Scar tissue is difficult to treat safely with x-rays since it is radio-resistant. This leaves but a small margin of safety between the therapeutic dose and an overdose. None the less, x-rays can on occasion be very satisfactory in treating a single nodule of fibrous tissue in the skin. In successful cases the nodule softens and shrinks, and further manifestations do not appear. X-ray therapy is not satisfactory in the treatment of more widespread cutaneous manifestations or subcutaneous masses.

I wish to acknowledge my indebtedness to Mr. H. J. Seddon for permission to publish figures 3 and 4.

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THE GENERAL MEDICAL COUNCIL

DISCIPLINARY POWERS AND PROCEDURE

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When the General Medical Council was instituted by the Medical Act, 1858, the members were given the duty to exercise discipline over the medical profession. Under section 29 of that Act the Council have power to determine whether a registered medical practitioner has been guilty of infamous conduct in any professional respect and, if so found, to direct erasure of his name from the Medical Register. The Act, however, did not prescribe the procedure to be followed on these occasions. In consequence, the Council were handicapped in several ways, notably by their inability to hear evidence on oath and to compel the attendance of witnesses; nor was there any provision for an appeal from a decision of the Council. In 1944, the Council set up a committee to draft a Bill which incorporated appropriate remedies. In due course this reached the Statute Book as the Medical Act, 1950, and it is the purpose of this article to review the effect of this Act upon the disciplinary procedure of the Council.

AUTHORITY TO HOLD DISCIPLINARY PROCEEDINGS

In this Act it is enacted that 'If any registered medical practitioner shall be convicted by any court in the United Kingdom or the Republic of Ireland of any felony, misdemeanour, crime or offence, or shall after due enquiry be judged by the General Council to have been guilty of infamous conduct in any professional respect, the General Council may, if they see fit, direct the registrar to erase the name of such practitioner from the register' (Medical Act, 1858, s.29, as amended by the Medical Act, 1950, s.18 (1)).

THE DISCIPLINARY COMMITTEES OF THE COUNCIL

The Medical Disciplinary Committee.—It is no longer the duty of the Council as a whole to decide penal cases since this duty was transferred to a new committee of the Council, the Medical Disciplinary Committee, specifically created by the Medical Act, 1950, s.14. This Committee consists of the President and eighteen other members, who are elected by the Council. The members must include six who have been elected to the Council by the medical profession and two others who are neither registered nor hold any registrable qualification (Medical Act, 1950, s.15 (1)).

Membership of the General Medical Council and, in particular, of its Penal Cases and Medical Disciplinary Committees, can be incompatible with membership of a defence society. The observations of Lord Justice Bowen, when he delivered judgment in an appeal of Leeson *v.* G.M.C., 1889 (59, L.J. Ch. 233), are a clear direction. In his opinion, it was undesirable

that a member of the Council, whether he be a member of, or only a subscriber to, or guarantor of, a defence society should participate in the hearing of any case which is brought before the Council by his society. The member should either withdraw from the case or, as many have done, he should sever his connexion with the Society, during the period he serves on the General Medical Council (Forbes, *Med.-leg. J.*, 1951, **19**, 50).

The quorum of the Committee is five. In ordinary circumstances not more than nine members may be invited to attend a hearing. When, however, it appears to the President that the circumstances are of a special kind, an invitation may be sent to every member of the committee. This has already happened on one occasion, as up to July 1951 (Heseltine, 1951, personal communication). On all occasions the committee must include at least one lay and two elected members of the Council.

All acts by this committee are decided by the votes of a majority of the members present (Medical Act, 1950, s.15). The President no longer has a casting vote and is thus relieved of what had been, in the past, a most invidious responsibility. With the exception of the President, no member of the Council may attend the hearing of any case by the Medical Disciplinary Committee if he has already acted as a member of the Penal Cases Committee when it considered the case.

The Committee has power to prepare rules of procedure for the approval of the Privy Council. The initial rules, some seventy in number, are embodied in the Medical Disciplinary Committee (Procedure) Rules, 1951; S.I., 1951, No. 665.

It is the duty of this Committee to try practitioners who are alleged to have been guilty of infamous conduct, and the cases are referred to this Committee by the Penal Cases Committee.

The Penal Cases Committee.—The Council had already appointed a Committee to consider penal cases prior to a hearing by the full council. The new Act, under section 16 (2), established this as a statutory committee with a duty to act as a committee of preliminary inquiry. It stands in relationship to the Medical Disciplinary Committee in much the same way that a Magistrates' Court, sitting as a Court of Preliminary Enquiry, stands to a Court of Assize.

This Committee consists of the President and five other members, who are elected by the Council. It is provided that the committee shall include one member who is neither registered nor holds any registrable qualification. The other four members shall be representative of the Branch Councils: two members of the English, one of the Scottish, and one of the Irish Branch Councils. The quorum of this Committee shall be three.

THE INSTITUTION OF DISCIPLINARY PROCEEDINGS

The General Medical Council does not of itself institute proceedings. These arise only after an offence is brought to the notice of the Council, and this can be in one of three ways. There is statutory provision for the notification of the conviction of a registered medical practitioner of any offence in any Court in the United Kingdom. It is the duty of the appropriate officer of the Court to send a notice of the conviction to the Council. This was ex-

tended by the Medical Act, 1950, s.18 (2) to matrimonial proceedings. The Council will now receive notice of the grant of any decree nisi when it is shown that a registered medical practitioner, cited as a co-respondent, has committed adultery with the respondent.

Another ground for disciplinary action is the notice by a University or College, being a licensing body, that they have struck the name of a registered medical practitioner from their list of graduates or diplomates. It does not appear that this notice is obligatory, nor is the Council compelled, upon receiving notice, to direct erasure of the name from the Medical Register.

The third way in which notice is received is by a complaint laid by any member of the public. It may be by a patient or a fellow-practitioner or by some person acting in his official capacity. From time to time an official of a medical defence society may lay a complaint, or it may be, on other occasions, an officer of a University or College or an official of a government department. These complaints are received in the first instance by the Registrar, who has a duty to bring them before the President. In the exercise of his discretion, he is likely to deal with trivial or vexatious complaints personally, but when the complaint of a private person appears to have substance, it will be required to be set forth in a statutory declaration. When satisfied by this that there is reason to believe some professional misconduct has occurred, the President will bring the matter to the notice of the Penal Cases Committee. Complaints by persons in their official capacity will go direct to that committee. If the committee finds that there is a *prima facie* case of infamous conduct, the case is referred to the Medical Disciplinary Committee for trial.

THE SCOPE OF DISCIPLINARY INQUIRIES

The scope of these inquiries is extended by statute to 'infamous conduct in any professional respect'. It is therefore necessary to consider this phrase, and in particular the word 'infamous', because it was criticized by no less an authority than the late Lord Justice Scrutton in Rex *v.* the G.M.C., *ex parte* Kynaston (C.A. 1930, page 220).

The learned judge recognized that this term had force but, when applied, as in the case then under consideration, i.e., to the professional offence of advertising, he considered its description as infamous to be inappropriate. He recognized advertising to be serious misconduct in a professional respect, 'but to talk of it as infamous is using ridiculous language'. This view has the support of reputable dictionaries which define 'infamous' as something 'notoriously vile or abominable' (the Concise O.E.D.) or 'notoriously evil, vile or abominable' (Everyman's English Dictionary).

When misconduct is of the kind exemplified by advertising Lord Justice Scrutton suggested that it could be better defined as 'serious misconduct according to the rules, written or unwritten, governing the profession'. The term 'infamous', however, is established by statute and long usage and the definition of infamous conduct, generally accepted, continues to be that which was cited by Lord Esher during the case of Allinson *v.* the G.M.C. (Q.B., 1894, i, 750, at pages 760-761; *Law Times*, 1894, vol. 63, page 534).

It was then said by him 'I adopt the definition which my brother Lopes has drawn up, of, at any rate, one kind of conduct amounting to "infamous conduct in a professional respect" ' viz., 'If it is shown that a medical man, in the pursuit of his profession, has done something with regard to it which would be reasonably regarded as disgraceful or dishonourable by his professional brethren of good repute and competency, then it is open to the General Medical Council to say that he has been guilty of "infamous conduct" in a professional respect'. The question is, the learned judge continued, 'not merely whether what a medical man has done would be an infamous thing for anyone else to do, but whether it is infamous for a medical man to do'.

This does not take into account offences committed outside the course of medical practice but which are none the less disgraceful and render the practitioner unfit to remain a member of the medical profession. Lord Esher's words suggest that he contemplated other kinds of infamous conduct.

The General Medical Council have never indicated the limits of infamous conduct nor are they prepared to state their attitude towards hypothetical circumstances. This practice, no doubt, the Medical Disciplinary Committee will continue to follow. The Council take the view that they cannot determine whether any circumstances constitute infamous conduct unless they come within the terms of a previous decision, or until the facts of a specific offence are before the Disciplinary Committee. This attitude has not escaped criticism and the Council have been thought to exhibit a peculiar hesitancy, strange muteness, or evasiveness when pressed for pronouncements of a positive kind (Forbes, *Med.-leg. J.*, 1951, **19**, 50). Thus, the Council, in advance of receiving a complaint which alleged advertising, would not pronounce upon the conduct of registered medical practitioners who engage in the health education of the public through the medium of the radio or television. It must be remembered, however, as pointed out by the late Mr. Heseltine (*Ibid.*, p. 55) that the Council [and now the Medical Disciplinary Committee] are the judges of professional conduct and therefore they must follow judicial procedure. It is undesirable and improper for them to pronounce upon general propositions or suppositions and thus to commit themselves, in advance of proof of the facts, to any decision they may have to make. Any departure from this attitude will seriously undermine, if not nullify, their authority as guardians of the standard of professional conduct.

The General Medical Council are at some pains to make clear to all registered medical practitioners the specific offences which are likely to result in erasure. Each newly registered practitioner receives a copy of the Warning Notice which gives details of offences which constitute infamous conduct, but the Council stresses the fact that it is not complete and that the notice includes only examples. The Disciplinary Committee can consider any form of professional misconduct although it may not appear to come within the scope or precise wording of any of the categories instanced.

The Warning Notice makes it clear to practitioners that they must exercise due care in the issue of certificates, notifications, reports or any documents of a kindred character. If any of these be untrue, misleading or issued improperly, the offence may lead to erasure. Nor will the Council

tolerate the offence of 'covering' whereby a registered practitioner enables any unregistered person to attend, treat, or perform an operation upon a patient in respect of any matter requiring professional discretion or skill. Provision is made, however, to permit the proper instruction of *bona fide* medical students or the legitimate assistance of medical auxiliaries, e.g. midwives, laboratory technicians, who are under the *immediate personal supervision* of a registered medical practitioner. The Council will not allow a registered practitioner to associate with unregistered persons either by administering an anæsthetic or otherwise, to enable an unregistered person to attend, treat or operate upon any other person. The registered practitioner may not advertise or canvass for patients, or allow anyone else to do so on his behalf.

Although it receives no mention in the Notice, proof of adultery with any person with whom the practitioner stands in a professional respect will almost certainly, and for obvious reasons, result in erasure.

Dichotomy or fee-splitting is also omitted from the Notice.

In 1933, however, the then President (Sir Norman Walker), in his address to the Council (*Lancet*, 1933, **i**, 1147) said 'I have been informed that the practice of dichotomy or fee-spliting, which we have heard is regrettably prevalent in some countries, is raising its head in this. I wish I could think that my information is incorrect . . . A conviction under the Act for Punishment of Corrupt Transactions with Agents, VI. Edward VII, C.34, would inevitably bring the offender under the jurisdiction of this Council'. The legal aspects of this offence are summarized in the *British Medical Journal*, 1933, **i**, 1112, and in March 1933, an anonymous young surgeon in London described in some detail, and without credit to himself, his personal experience of dichotomy (*Lancet*, 1933, **i**, 493).

Abuse of the privileges granted to registered medical practitioners under the Dangerous Drugs Acts will also result, whether the subject of criminal proceedings or otherwise, in disciplinary action when the facts come to the notice of the Council.

'DUE ENQUIRY'

The Disciplinary Committee are not compelled by statute to hold due inquiry on all occasions. The amended Section entitles the committee to direct erasure of a name upon receiving formal proof of a conviction of any felony, crime or offence without due inquiry into the circumstances. It is sufficient that the offence is already of a kind which in the past has resulted in erasure. Notwithstanding this provision, it has not been, nor is it likely to be, the practice to direct erasure unless and until the practitioner concerned has had opportunity to be heard by the committee. It is of course no part of their duty, even were they competent, to re-try the case or to sit as a Court of Appeal. The decision of the Court is binding upon the committee in respect of the facts of the criminal offence. The committee, however, have the duty to determine whether it is also infamous conduct and, even if that is not in doubt, they may also consider evidence in mitigation of the additional penalty of erasure. Convictions notified by the Courts are first considered by the Penal Cases Committee, who may decide that there is no *prima facie* evidence of infamous conduct.

Erasure upon formal proof of a conviction seems likely to occur without due inquiry only when the circumstances are of a kind which would cause any reasonable person to regard the offender as unfit to continue to belong to the medical profession. It is probable also that the offence would have been committed other than in the course of medical practice and where it is not in the public interest to hold an inquiry.

The importance of holding due inquiry, even when it might appear that the conviction of an offence renders it unnecessary or superfluous, is illustrated by the case of a registered medical practitioner who was convicted of an indecent act in 1949. The Council found the respondent had been convicted of the misdemeanour but they did not see fit to direct erasure (*Brit. med. J.*, 1950, **ii,** suppl., 237).

Due inquiry following conviction of offences under the Dangerous Drugs Acts or the Road Traffic Act, 1930, is often of distinct advantage to the offender. Not rarely, the Council, upon finding the facts proved, have either adjourned the case or postponed sentence in order to give the offender an opportunity to mend his ways or to undergo appropriate medical treatment before the final decision is taken. It has often happened that upon proof of good behaviour during the interim period, and an undertaking not to repeat the offence, the Council have not directed erasure.

DUE INQUIRY ARISING OUT OF MATRIMONIAL PROCEEDINGS

Evidence of adultery.—The Medical Act, 1950, s.18 (2) enacted that the Medical Disciplinary Committee, when holding an inquiry into a case, which arises out of matrimonial proceedings in the Courts, shall be bound by any finding of fact which is shown to have been found by the Court, or on appeal from its decision, as conclusive evidence of that fact. This therefore modifies the rule in Spackman's case, and a practitioner may not now seek to offer evidence additional to that before the Court in order to go behind a finding of adultery. If such evidence is tendered the Committee must refuse to hear it. The duty of the Committee is not to determine whether adultery had or had not been committed, but whether such adultery was by a registered practitioner who stood in a professional respect to the other party. As the then President of the Council said, in 1945: 'The question before the Council [now Committee] is solely the professional relationship' (*Brit. med. J.*, 1945, **i,** suppl., 116).

Professional relationship.—A registered medical practitioner who was in medical attendance upon the other party at the time of committing adultery, stands in a professional relationship. This may be extended by the Committee to circumstances beyond current responsibility for a patient's medical care. It may well be that the Committee would regard an introduction to the other party in consequence of professional attendance as standing in a professional relationship, even though adultery took place at a time when the practitioner had ceased to be the medical attendant. It seems the test is, did he first come to know this person because he was consulted by her professionally? It is not apparent that the Council have made any pronouncement on this point. It remains to be seen whether the inclusion of

a person's name on the practitioner's list of patients under the National Health Service of itself constitutes a professional relationship. If the practitioner has never attended and treated the person, although the name is on his list, does he stand in professional relationship? This point was raised by Counsel for the respondent in November 1950 (*Brit. med. J.*, 1950, **ii,** suppl., 237).

The practitioner had been convicted by the Courts of an indecent offence, committed with a boy whose name was on his Health Service list but whom he had never attended professionally. Since the Council did not see fit to direct erasure, it would appear that the view which is likely to be taken is that mere inclusion of a name on the doctor's list does not constitute a professional relationship, for the purpose of disciplinary proceedings.

DUE INQUIRY FOLLOWING NOTICE OF DISCIPLINARY ACTION BY A UNIVERSITY OR COLLEGE

The Medical Act, 1950, s.19 (1) repealed section 28 of the Medical Act, 1858, which relates to these circumstances.

When the Medical Disciplinary Committee is informed by a University or College that they have deprived a person of his qualifying diploma, by striking his name from their list, the registrar of the General Medical Council is required to make a note of the fact in the Register. It does not necessarily follow that disciplinary action will be taken by the Council. In that event, however, any findings of fact which may be reported to the Committee by the University or College, on which they based their decision, may be regarded as conclusive evidence of that fact; this, it will be noted, is permissive, and not mandatory as in the case of facts found by a Court.

It appears that the Medical Disciplinary Committee may consider the legality of the disciplinary action taken by the University or College and reach its own conclusions. Striking off is required to be in the exercise of any power conferred by law, and the respondent may allege irregularity. More probably, however, if this point arose, it would be taken to a Divisional Court for a decision.

When deprived of his diploma, if it be his only registrable qualification, his name can, it seems, remain on the Register at the discretion of the Council. It would be an interesting situation if, after due inquiry, the Committee determined that he had not been guilty of infamous conduct and did not see fit to direct erasure of the name. This finding would be obligatory, if it were shown that the sole ground on which a College had struck off a name was because the practitioner had adopted some theory of medicine or surgery to which the College did not subscribe, since this is contrary to section 23 of the Medical Act, 1858. No instance of the kind appears yet to have arisen.

DISCIPLINARY PROCEDURE

When a registered medical practitioner is to be summoned before the Disciplinary Medical Committee he is entitled to have details of the complaint or information and due notice of the hearing. He has the right to be heard in person or to be represented by counsel, or solicitor or by an officer

or member of any organization of which he is a member or by a member of his family (Medical Act, 1950, s.16 (2b, c and d). Medical Disciplinary Committee (Procedure) Rules, 1951, Rule 65 (2)).

Except as is provided by the Rules, the hearing must be in public (Medical Act, 1950, s.16 (2) (e)). The public will be excluded when, in the interests of justice or for any special reason, the committee decide to sit in camera (Rule 60 (1)). The public may also be excluded when the Committee are considering and determining certain questions, for example whether judgment should be postponed or further postponed. Other occasions are prescribed by the Rules.

The Committee may adminster oaths and now also have power to compel the attendance of witnesses and the production of documents. Any party to the proceedings may sue out writs of *sub poena ad testificandum* and *duces tecum*, subject only to the same rules which apply to the Courts (*Ibid.*, s.16 (1)).

The decision of the Committee is made in public on all occasions and it is now to be a precise finding: either guilty or not guilty of infamous conduct (*Ibid.*, s.16 (2) (f)). The older formulæ, of a 'not proven' order, are abolished.

The first rules were made on April 17, 1951, and came into force on the following day (S.I., 1951, No. 665). They are made subject to the approval of the Privy Council who have statutory power to approve or modify the rules (Medical Act, 1950, s.16 (4)).

The issue to be determined by the Committee is limited to a determination of whether the respondent has been guilty of infamous conduct in a professional respect. In the case of complaints arising out of matrimonial proceedings the Committee will also determine whether the respondent before them stood in a professional relationship to the party with whom he was found by the Courts to have committed adultery.

Upon finding a practitioner guilty of infamous conduct the Committee can impose only one sentence, namely, erasure of his name from the Medical Register. It has been suggested that alternative penalties by way of suspension or a fine should be within their discretion. The 'all or nothing' character of a sentence of erasure is, however, only apparent, because in the past it was, not rarely, no more than suspension for a period of six months. The respondent could apply for restoration to the Register at the next Meeting of the Council, and this was sometimes granted. In future the Committee have similar powers except that the minimum period which must elapse between erasure and restoration is now eleven months (*Ibid.*, s.21 (3) (a)). The General Medical Council have never favoured the imposition of fines in these cases as the offences under consideration are not to be measured in such terms (Heseltine, *Med.-leg. J.*, 1951, **19**, 55).

The Legal Assessor.—Provision was made to afford the Medical Disciplinary Committee competent legal advice during its sittings. This is the duty of the Legal Assessor, whose appointment and functions are governed by rules which are made by the Lord Chancellor. Candidates for the office must be barristers, advocates or solicitors of not less than ten years' standing (Medical Act, 1950, s.17).

The assessor to the Committee not only gives legal advice, but he may also, with leave of the Chairman, put questions to any witness (rule 62 (2)). The Act further provides (s.17 (2a & b)) that the rules ensure that his advice is given to the Committee in the presence of every party or their representatives. If his advice is given

after the Committee have begun to deliberate as to their findings the parties must be informed of any advice given and if in any case the Committee do not accept that advice.

APPEAL FROM DECISIONS OF THE DISCIPLINARY COMMITTEE

Until 1950, the decisions of the General Medical Council on questions of infamous conduct, except in special circumstances, were without appeal. It would have been necessary to prove that the proceedings were grossly irregular, or that there was no evidence before the Council to justify their findings or that from any cause the decision constituted a gross miscarriage of justice.

The dental practitioner was better placed, perhaps because some misgiving was felt about the provisions which governed disciplinary action against doctors. The Dentists Act, 1921, s.9, provided that any dental surgeon, who is aggrieved by a decision to erase his name from the Dentists Register, has the right of appeal to the High Court.

Under the Medical Act, 1950, any registered medical practitioner now has the right of appeal against a decision of the Medical Disciplinary Committee. Because there may be appeals by practitioners in the Irish Republic, who also come under the jurisdiction of this Committee, an appeal lies to the Judicial Committee of the Privy Council.

It is provided that appeals may be lodged at any time within twenty-eight days of the service on the practitioner of the notice of the Disciplinary Committee's decision (Medical Act, 1950, s.20 (3)).

Appeal is by way of a petition which must be properly drawn. The rules which govern procedure are distinctly technical and it is unlikely that anyone but a practising lawyer, familiar with the procedure, can safely handle these matters. The rules are embodied in the Medical Act, 1950 (Judicial Committee Rules) Order 1951, S.I., 1951, No. 1383, of which copies may be obtained from H.M. Stationery Office. This document also specifies in a schedule the fees allowed to agents conducting appeals. Even excluding Counsel's fee, these several items present a formidable total.

Skilled assistance, both by solicitor and counsel, is virtually obligatory when an appeal is lodged before this high judicial authority. It therefore becomes a costly venture. Medical defence societies, however, are already prepared to assist any member, when it appears they have just cause for complaint against the decision of the Disciplinary Committee (Medical Defence Union Annual Report, 1951).

There is provision for an appeal in *forma pauperis*, when the appellant must prove that he is 'not worth £25 in the world excepting his wearing apparel'.

The first appeal under the Medical Act, 1950, was dismissed when it was disposed of in July 1952. The appellant, who appeared in person, had had his name erased from the Register on December 8, 1951, because he was found guilty of misconduct with a woman patient. When he contended that the Disciplinary Committee had been improperly influenced by his previous record the Court reminded him that the information was not before the Disciplinary Committee until they had reached their decision on the facts of the case and that had it been satisfactory it would have been to his advantage (*Brit. med. J.*, 1952, **ii**, 291; *Lancet*, 1952, **ii**, 294).

This first decision of the Judicial Committee indicates that it is unlikely that any future appeal which seeks to go behind a decision of the Disciplinary Committee on the specific question of infamous conduct will succeed. Ever since 1863 the Courts have declined to determine this question and, in 1929, Lord Hewart in Rex *v.* G.M.C., *ex parte* Kynaston, held that it is well settled that the Court has no power to review the conclusions of the Council, now the Disciplinary Committee, on this question. It is one which both the Medical Acts of 1858 and 1950 have expressly left to the Council and its Disciplinary Committee. It is thus unlikely that the Judicial Committee will take a view which differs from that already taken by the other Courts.

RESTORATION TO THE MEDICAL REGISTER

The General Medical Council, through its Disciplinary Committee, have discretion not only to erase, but also to restore names to the register. Statutory provision for restoration after penal erasure was made for the first time by s.21 of the Medical Act, 1950.

In the event of an erasure because a practitioner has failed to reply to the registrar's letter of inquiry, issued under s.14, Medical Act, 1858, restoration to the register, although at the discretion of the Committee, is, presumably, never refused; certainly not if there is a satisfactory explanation of the circumstances and the requirements of the Council are fulfilled.

Standing Orders of the Council provide that the practitioner must make written application, supported by a statutory declaration and at least two certificates of identity and good character in prescribed form. An applicant for the restoration of his name, when erased by request, must comply with the same requirements.

If erasure followed registration based on fraud or error, it is permissible, if that be the only reason for erasure, for the practitioner to apply to the Disciplinary Committee for restoration to the register. It is then for the Committee to exercise their discretion, either to reject the application or to defer registration for a specified period (Medical Act, 1950 s.21 (2)).

Penal erasure is not final and it has always been permissible for the respondent to apply for restoration of his name to the register. Application, however, shall not now be made before the expiration of eleven months from the date of erasure or in any period of eleven months in which such an application has already been made (Medical Act, 1950, s.21 (3a & b)).

The application will be heard by the Committee in private; only their decision will be made in public. The practitioner has the right to be heard and to be legally represented. He will be required to furnish evidence of identity and of good conduct during the period which has elapsed since erasure of his name. The Committee will also hear any complainant whose allegations led to penal erasure of the practitioner's name, e.g., a patient, another doctor, or official of a University or College or of a defence society.

Although I am indebted to the late Mr. Heseltine for his personal communication, the responsibility for this article is mine alone.

THE STORY OF BRITISH INSULIN

By WILLIAM A. R. THOMSON, M.D.

In December 1950, the Board of Trade, acting under the terms of the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948, requested the Monopolies and Restrictive Practices Commission to investigate the question of the supply of insulin in this country. The Commission's report*, which has now been published, is a complete vindication of the manufacturers' policy: the Commission 'find that the arrangements now made by the British Insulin Manufacturers, individually and collectively, for the supply of insulin operate and may be expected to operate in the public interest and we do not recommend that any of them should be discontinued'.

The Report is of outstanding interest to all who are interested in insulin, including doctors and, if only as 'the story of insulin', should enjoy a large circulation. Before proceeding to summarize its essential points, it is of interest to note that 'The Supply of Insulin' is the fifth report to be published by the Commission, its predecessors in chronological order having been on the supply of dental goods, cast iron rainwater goods, electric lamps, and insulated electric wires and cables. A curious conglomeration to the medical man in the street!

THE SUPPLY POSITION IN GREAT BRITAIN

The whole of the insulin now supplied in the United Kingdom is produced by four companies. Since February 1941, these companies have been organized 'from a formal point of view very loosely' as the 'British Insulin Manufacturers' (B.I.M.). Prices and discounts for British insulin are uniform. In 1950, the total insulin sales of these manufacturers amounted to a quantity of 3,131.9 million units and a value of £1,266,722, of which 55.8 per cent. (by quantity) and 60.7 per cent. (by value) was supplied to the home market. Eighty per cent. of the insulin consumed in this country is distributed by retail chemists and the remainder by hospitals, with the exception of a very small amount (in 1950, less than ½ per cent.) obtained by the Ministry of Health for Service requirements. By law, the only traders who may sell insulin by retail in this country are registered pharmacists. It is estimated that there are 200,000 diabetics in the United Kingdom, of whom 60 to 70 per cent. are receiving insulin. The great majority of these obtain their supplies through the National Health Service. A labour force of approximately 250 is employed in manufacturing insulin in the United Kingdom, excluding the labour required for the sterility and biological tests. A relatively high proportion of the personnel possesses professional or technical qualifications.

*'Report on the Supply of Insulin', London: H.M. Stationery Office, 1952. Price 1s. 6d.

THE DISCOVERY AND INTRODUCTION OF INSULIN

The dramatic story of the early days of insulin is graphically told: the discovery of insulin at the University of Toronto in the summer of 1922, followed immediately by the decision to apply for patents in Canada, the United States and Great Britain, which were assigned to the Governors of the University of Toronto 'to prevent the exploitation of the public and to secure some control over the quality of the commercial product'. The first British patent was granted on June 13, 1922. Before this was taken out the University of Toronto suggested to the Medical Research Council in this country that its prospective rights under it should be assigned to the Council. The Medical Research Council ('though averse in principle to any proposal for the patenting of medical preparations'), accepted the University's offer and decided to control insulin production by licensing under the British patent, but on the condition, which was accepted by the University, that 'the assignment should be free, no royalties being paid to the University from this country for the use of the patent'. In September 1922, two of the Medical Research Council's officers, Dr. (now Sir Henry) Dale and Dr. W. H. Dudley, visited Toronto to discuss with Dr. Best and Dr. Banting the problems involved in the commercial production of insulin. British-made insulin was first marketed in April 1923.

DEVELOPMENTS BETWEEN 1923 AND 1939

During the period, 1923-27, the great bulk of the British requirements of ox pancreas was obtained from slaughterhouses in England and Scotland. In 1923 the Medical Research Council took out a patent for a process of purification. English manufacturers were given permission freely to use the process, and the patent rights were extended, at the request of the University of Toronto, to Canada and the United States, and the Council's rights in these countries were assigned freely to the University of Toronto for exercise by it. During 1924, insulin production in this country increased sufficiently to meet home demands and to allow some exports. The University of Toronto, which held the patent rights in certain overseas countries, issued to each of the English manufacturers a licence to allow them to distribute insulin to these countries, other than Canada and the United States, imposing a royalty payment of 5 per cent. on such exports. These royalty payments have now ceased to be made. British-packed insulin has never been sold in Canada or the United States. During this period, although there was no control over imports of insulin into the United Kingdom, such imports were in relatively small quantities.

During the period, 1928-40, a certain amount of German and Danish insulin was imported. In March 1932, insulin became subject to the general *ad valorem* duty chargeable under the Import Duties Act, 1932. In December 1933, 'insulin and its salts' were added to the list of fine chemicals which, under the Safeguarding of Industries Act, 1921, were subject to

33⅓ per cent. Key Industry Duty. At the same time the British insulin manufacturers undertook not to raise their prices; actually they were lowered. In the Finance Act, 1934, imported insulin was entirely freed from duty. Throughout this period collaboration continued between the insulin manufacturers. There was also increasing use of imported pancreas, and home collection practically stopped between 1934 and 1939.

SOME WAR-TIME PROBLEMS

In February 1941, was held the first meeting of the 'British Insulin Manufacturers' (B.I.M.) to discuss 'the threat to pancreas supplies, the possibility of loss of insulin stocks or damage to plant from enemy action, and a considerable and understandable degree of apprehension on the part of the medical profession, the pharmaceutical trade and the diabetic public, which had resulted in some "panic" buying of insulin and an artificial scarcity'. One of the first moves was to make successful representation to the Ministry of Supply for the obtaining of considerable quantities of solid insulin from the United States under lease-lend in 1941 and 1942, to build up a reserve stock. There was increased collaboration between manufacturers at all levels, one of the most important results of which was a remarkable increase in the insulin yield per pound of pancreas. At the same time an educational campaign was undertaken, in cooperation with the Ministry of Food, among workers in slaughterhouses in this country, explaining the need for careful removal, trimming, and quick freezing of pancreas. This led to an increased yield of insulin from home-produced pancreas. In January 1944, largely as a result of suggestions made by the Diabetic Association, a uniform scheme for labels and cartons, which clearly differentiated between the different kinds and strengths of insulin, was introduced by all manufacturers of insulin.

DEVELOPMENTS SINCE 1946

The greater part of ox pancreas, the principal source of insulin in this country, is still imported. The delivered price for British ox pancreas in 1950 was considerably less than the average price of imported glands but, in spite of the improvements already referred to, the yield of insulin from British glands is poorer than that from imported glands. New sources of supply are constantly being investigated in order to ensure that glands shall be available at the lowest practicable price.

The present method of insulin manufacture as used by each of the British manufacturers is essentially the same. The process is not protected by patents but is secret.

THE PRICE OF INSULIN

So far as price is concerned, the members of the B.I.M. charge common prices. There is 'a general unwritten understanding that no company should

alter its prices without first informing the others and discussing the proposed changes with them', but any manufacturer is free to sell at the lowest price he desires. On the other hand, it is pointed out by the B.I.M. that 'it is an inevitable concomitant of the free exchange of information in the technical field that the manufacturers engaged in technical collaboration will not exploit unfairly the advantages so obtained'. The success which British manufacturers have achieved in supplying insulin at the lowest possible cost is strikingly brought out in a table in the Report showing the retail prices of 5 c.c. (20 units per c.c.) packs of insulin (unmodified) from 1923 to this year. In April 1923 this price was 25*s.*; in July 1952 it was 1*s.* 5½*d.* Actually the lowest price achieved was 1*s.* in 1944. The subsequent increase is almost entirely due to the increased cost of pancreas: the 1950 average price of pancreas (home and imported) was about four times that of the 1939 price. The importance of this increase in price of pancreas is evident when it is realized that the cost of pancreas represents approximately 45 per cent. of factory cost. It is pointed out in the Report that insulin prices in the United Kingdom are the lowest in the world, with the possible exception of those charged in Scandinavia.

Finally, it is of interest to note some of the views concerning British insulin and its manufacture which the Commission obtained from independent authorities. 'The Ministry of Health has told us that in its view and that of the National Institute of Medical Research, the quality of British insulin is unsurpassed. It considers the members of the B.I.M. to be extremely public-spirited in all that concerns the interest of diabetics ... The Director of the Department of Biological Standards of the National Institute for Medical Research has said that he has a high opinion of the B.I.M.'s work, both in research and in other fields connected with insulin production'. The physician-in-charge of the Diabetic Clinic at King's College Hospital, London, who is also Chairman of the Diabetic Association, has told the Commission that 'the quality of British insulin is first-class, that he has the highest respect for members of the B.I.M. . . . and that, in his view, the United Kingdom market is adequately supplied and the importation of additional brands would only cause confusion'. The sixteen selected hospitals with diabetic clinics which were also consulted by the Commission 'expressed general satisfaction with the present insulin position'.

CONCLUSION

It is to be hoped that this Report will receive widespread publicity. It provides a striking and, let it be added, well-deserved vindication, from a completely impartial body, of the outstanding services which the pharmaceutical industry is rendering to the advance of medicine and the welfare of the community. What is equally impressive is the evidence it provides of how effective can be cooperation between private enterprise and Government departments and officials.

GENERAL PRACTITIONERS' FORUM

TO SNIFF OR TO BLOW?

By J. M. B. MORWOOD, M.B., B.Ch.

I AM perpetually surprised by mothers who bring their small children to me suffering from colds in their noses who say, 'I cannot get him to blow his nose', as if the children were laying a deep plan to achieve parental frustration. So great is the popular misconception in this matter that untold numbers of parents must suffer needless anxiety which could easily be removed by their doctors. The pathology I am referring to is the massive hunks of mucopus in the child's nose which should obviously be got rid of. They cannot be completely removed by wiping. The child cannot blow them out and, in deference to his mother's wishes, does not sniff them up and swallow them. To examine this juvenile quandary, one must carefully weigh up the advantages and disadvantages of the two procedures.

Blowing is a fundamentally unsound action. Organisms are blown into cranial cavities not previously affected, the most important being the middle ears and, if the act is successful, the mother's (or the father's) handkerchief, the child's hands, body, hair or sleeve become smeared with a sticky and noxious as well as dangerous fluid.

In contrast with the act of blowing, *sniffing* is fundamentally sound. The motion of the disagreeable liquid is in the direction of flow produced by the cilia of the nasal mucous membrane. Mucus and mucopus are aspirated from the cranial cavities instead of being blown into them, and the result is sanitarily disposed of by swallowing. It might be objected that the baby's stomach contains no antiseptic hydrochloric acid. That is usually true, but it has yet to be shown that swallowed sputum from the nasopharynx, containing no exotic organisms, is a cause of disease, and the organisms found in association with the common cold I believe to be so common that even the baby can easily slaughter them in any situation other than the middle ear.

This question has, so far, been abstractedly dealt with as if it were a purely voluntary matter on the part of the baby as to whether it should sniff or blow. The baby, of course, cannot blow (unless it be a sneeze), so it must be assumed that sniffing has more survival value in the evolution of the baby than blowing. If therefore we are believers in the delicate association of physiological function with survival in competitive evolution, we must believe that more babies will grow up to reproduce their kind if they resist their mother's exhortations and persist in their physiological fallacy.

TREATMENT OF THE COMMON COLD

The common cold should be treated by tyrothricin nose drops. These drops, as opposed to the more frequently prescribed penicillin nose drops, do not produce resistant organisms, and should the infection extend to the

middle ear, parenteral penicillin would be fully effective. Eucalyptus, menthol and other inhalations are reasonable lines of treatment, but ephedrine, which opens all the channels into the cranial cavities which the body has closed as a protective mechanism, should, on the basis of these arguments, be avoided. Even catarrhal otitis media, for which one is strongly tempted to use local ephedrine in the nose to allow the mucus to escape from the middle ear, I believe to be best treated by parenteral penicillin to keep the mucus sterile. Opening the medial ends of the Eustachian tubes by ephedrine might let infection reach the middle ear.

SUMMARY

The moral of my argument is that babies should be encouraged to sniff and be dissuaded from blowing, and I believe that the nasal mucopus may be swallowed with impunity.

THE LUNGS: A BACTERIAL FILTER

By A. V. MAGEE, M.B., Ch.B.

Clinical observations and pathological findings suggest that living bacteria may circulate in the blood without causing symptoms until they come to rest in a suitable place, multiply, produce toxins and irritate the surrounding tissues. Micro-organisms have been cultured from the blood in cases showing a temperature of no more than 99° F. (37.2 C.), and it is only by accepting the above supposition that we can account for the origin of many cases of acute pyogenic osteomyelitis, to mention only one disease.

In congenital valvular disease of the heart, a rare but constant cause of death is cerebral abscess occurring even without a superimposed malignant endocarditis. So far as I am aware, no case of a cerebral abscess occurring, *per se*, has been reported. The salient features of the case I am now reporting are as follows:—A congenital heart malformation leading to admixture of arterial blood and blood which has failed, at least once, to circulate through the pulmonary system; a collection of pus in the cranium; no evidence of a primary focus.

The patient, a boy of fourteen years, was admitted to hospital in a moribund condition. Breathing was laboured, the pulse weak and rapid and the surface of the body deeply cyanosed. Death occurred a few hours after admission. The boy had been ill for only a few days; although his parents had noticed his blue colour since birth they always considered him fit.

Post-mortem findings.—The body was emaciated, fingers and toes were clubbed and the colour of the skin cyanotic.

The heart: This organ showed evidence of congenital malformation. It was of the auricular trilocular type. Into the common auricular chamber there entered the superior and inferior venæ cavæ, the four pulmonary veins by two common orifices, and besides the other normal openings there was a persistent duct of Cuvier entering the left upper region of the

chamber. A few inches above its termination this vessel gave off a communicating branch to the superior vena cava. On the floor of the auricular chamber, close to the entrance of the duct, there was a strong valve directing the blood from the abnormal vessel across the chamber towards the A-V orifice. On the roof of the auricular chamber there was a valve directing the blood from the pulmonary veins towards the left A-V orifice. The ventricles were normal in construction.

The brain: In the ventricles and throughout the cerebrospinal fluid there was pus containing pneumococci. The cerebral tissue itself was unaffected save by the pressure of the accumulated, thick ventricular pus.

The other organs, including the lungs, ears and spleen, were normal.

DISCUSSION

The pneumococci must have entered the cranium by the blood stream, by the lymphatics of the nasal cavities, or by the nerve sheaths. There is no reason, however, to think that the lymphatics or the nerve sheaths are more liable to transmit infection to the brain in congenital heart disease than in health. On the other hand, there are several reasons to allow of the assumption that the organisms entered *via* the blood stream.

(1) The pus was thickest, and therefore probably oldest, in the region of the choroid plexus of the third ventricle.

(2) The plexus received its blood direct from the auricular mixing chamber.

(3) If organisms were in the blood, the histological structure of the plexus suggests a suitable nidus for their arrest and growth.

The structure of the heart indicates that there was a fairly thorough mixing of venous and arterial blood in the auricle. In other words, there entered into the systemic blood stream some blood which did not circulate through the lungs at least once. In view of the frequency of pulmonary lesions in acute infective, and in certain malignant, conditions, the hypothesis must be considered that the lung tissue has the power of filtering the blood and removing pathological organisms (sometimes to its cost) or destroying them by oxidation.

In malaria, gonorrhœa and syphilis, the lungs usually escape infection, except in the case of syphilis, when congenital syphilis may cause 'white lung' in the newborn. In typhoid fever, the bacilli may appear in the sputum but always associated with pneumococci. In undulant fever, *Br. abortus* is found in the blood but the lungs escape infection.

This case might also serve to direct attention to the part played by the choroid plexus in various forms of meningitis, especially in tuberculous meningitis, secondary to a lesion elsewhere.

CONCLUSIONS

It is suggested that:—(1) The lungs have an, as yet, unknown function to perform in protecting the rest of the body from various infections and that

the function is carried out by oxidizing organisms which are susceptible to the process. (2) Certain organisms, such as the tubercle bacillus, are not killed by this process but remain to destroy the lung. (3) Cancerous emboli are quite unaffected by the process. (4) The heart and lungs work in close unison in this mechanism.

DISHCLOTH UNDERCLOTHES

By GERALD GIBBENS, M.B., B.S.

We wear woollen overcoats for warmth and to keep the rain out. We use linen or cotton towels to absorb moisture. It is not unreasonable to sleep between blankets—it is only uncomfortable and rather insanitary. To put sheets between us and the blankets greatly increases pleasure and cleanliness. So why do we wear woollen underclothes? They are expensive, difficult to wash, and are water-repellent, so that when we move with any energy at all, we sweat and stay wet and itchy and smelly for the rest of the day. I submit that the reason for this extraordinary habit is very old, and goes back to the period of English farming when the perpendicular towers of our parish churches were built on the profits of wool, and when the Lord Chief Justice first sat on the Woolsack. The Stuarts enacted laws compelling burial in wool, and members of some West-End clubs spend the last years of their life in much that state.

I have a patient whose underclothes might have been built by an armourer, and indeed they would probably offer real protection against a twelvebore. At short intervals through half the year I used to see him—'Seemed a nice day, old boy: went for a stroll. (Hack, hack, wheeze.) Blasted wind shifted to three points north of east. (Hake, hake.) Must have got another infernal chill'.

It takes a lot of argument to convince such people that vests made of dishcloth cotton (on the same needles as knitters use for dishcloths) are cheap, easy to wash, as warm as wool, softer than wool, and dry. For the price of a set of woollies, you can get three or four, and change really often; nobody minds washing them. You can run hard on an unexpectedly warm day and then sit down and be comfortable.

They should be made long, partly because there is nothing so annoying as a gap between vest and trousertop; partly because then one wears summer pants all the year. (To knit dishcloth pants might be rather a feat.) There are many makers of light cellular cotton for summer, and only diehots wear wool then. But, so far as I know, there is no maker of heavy cotton underclothes, so they have to be knitted.

Leaving theory aside and getting to the proof of the pudding: when your bronchitics wear heavy cotton next to the skin and spend their money on a light loose woollen overcoat, they will send for you half as often. When you wear it yourself, you will curse much less at the top of the second flight of stairs.

CURRENT THERAPEUTICS

LX.—PLASMA SUBSTITUTES

By W. d'A. MAYCOCK, M.B.E., M.D.
From the Lister Institute of Preventive Medicine, Elstree, Hertfordshire; Adviser in Transfusion, Ministry of Health.

SINCE the last war the transfusion of blood and, to a lesser extent, of plasma has become a common therapeutic procedure, especially in countries where transfusion services were developed during the last war to provide these fluids for the treatment of battle and civilian casualties. The growth in the use of blood since 1946 in England and Wales is well illustrated by the fact that in 1951 some 505,000 bottles of blood were provided by the National Blood Transfusion Service for hospitals and nursing homes, compared with some 183,000 bottles in 1946; over the same periods the number of bottles of plasma provided has tended to fall.

More recently, interest has been renewed in various solutions, conveniently called 'plasma substitutes', which are being used in increasing amounts in Europe and America. The reasons for this fresh interest can perhaps best be understood by a brief summary of the history of these substances.

The first plasma substitute was a solution of gum-saline which was introduced by Bayliss (1919) in the 1914-18 war and used extensively in the treatment of the wounded. The value of the restoration of the blood volume by blood transfusion in the treatment of oligæmic shock was properly appreciated for the first time during this war, but organized large-scale transfusion services did not exist, and supplies of blood were therefore comparatively limited; the blood that was available could not be preserved for more than periods of a few days, and the keeping properties and use of blood plasma were still not known. For these reasons there was an urgent demand for a solution which would restore the blood volume more effectively than saline solution, which was at first the only alternative to blood, and at the time gum-saline met this need.

Between the 1914-18 and the 1939-45 wars the use of gum-saline gradually decreased. Interest in plasma substitutes revived during the 1939-45 war because it was thought that even the relatively large amounts of blood and plasma which were available in well-organized countries such as Great Britain and the United States might not be sufficient for the treatment of casualties. Many different substances were examined and tested experimentally and clinically as plasma substitutes. Similar investigations were carried out in those countries, e.g., Germany, which were unable for one reason or another to organize adequate transfusion services to provide blood and plasma.

In general terms plasma substitutes are thus seen to have a real part to play in transfusion therapy:—

(a) In times of national emergency when the available blood and plasma may be insufficient for the treatment of the expected number of casualties.

(b) In countries where adequate transfusion services cannot be organized for climatic, geographical, financial or other reasons.

(c) In the treatment of individual patients, when blood or plasma cannot for some reason be obtained at all, or only after a period of dangerous delay.

Another reason for the use of plasma substitutes, which is often mentioned, is that they are free from the agent causing homologous serum jaundice, which may be present in plasma or serum. The incidence of this complication has been greatly reduced in recent years. In a survey made by Lehane *et al.* (1949) the incidence was shown to be about 1.5 per cent. following transfusion of small pool plasma (i.e., each pool prepared from not more than ten separate blood donations), which has been used in England since 1945. In the same survey the incidence of homologous serum jaundice following blood transfusion alone was 0.8 per cent.; the difference between the two series was not significant.

QUALITIES OF PLASMA SUBSTITUTES

The effects of transfusing a plasma substitute should resemble as closely as possible those following the transfusion of plasma itself. A solution with this general property must therefore possess qualities resembling those of plasma. These may conveniently be grouped into positive and negative qualities.

Positive qualities.—Any substance which is to be used as a plasma substitute should, when dissolved to make a solution, exert a colloid osmotic pressure of the same order as that of plasma, and the relative viscosity of such a solution should be similar to that of plasma or of blood. The outstanding difference between physiological saline solution (0.9 per cent.), which has only an evanescent effect in restoring a depleted blood volume, and plasma, which restores a depleted blood volume in a more permanent manner, is that plasma contains proteins which exert a colloid osmotic pressure by virtue of the fact that the vessel walls and renal glomeruli are normally impermeable to them. Water is thus held back within the blood vessels and prevented from passing through the capillaries into the tissues. Albumin (mol. wt. 69,000) is responsible for the greater part of the colloid osmotic pressure exerted by the plasma proteins. Saline, on the other hand, which contains no protein or other substance capable of exerting a colloid osmotic pressure, passes rapidly out of the circulation through the kidneys and through the capillaries into the tissues. For this reason an infusion of saline will only restore a blood volume which has been depleted by hæmorrhage, for example, for a few hours.

The substitute should be retained in the blood stream until its place has been taken by the normal plasma proteins. Since most of the substances

which have been used as substitutes are foreign to the body, they are removed from the blood stream either by the reticulo-endothelial system or by being completely or partly metabolized, or by excretion through the kidneys or in the bile or digestive secretions, or by a combination of all these methods. In practice, retention in the blood stream is important if reliance has to be placed solely or largely upon the use of a plasma substitute and blood or plasma cannot be given at all or only in inadequate amounts; if, on the other hand, adequate supplies of blood and plasma are accessible but not immediately available, retention within the blood stream is not of such great importance. For general purposes, however, any substitute should meet as nearly as possible the theoretical requirement mentioned.

Many of the substances which have been, or are, used as substitutes are polydisperse, that is to say, consist of a mixture of molecules of different sizes, but of the same general pattern ; dextran, for example, is composed of glucose molecules linked together into a long chain, with side branches of the same structure at intervals. Many different-sized molecules may thus exist in a sample of dextran, depending upon the length of the main chain and the number and length of the branches. The molecular composition of a plasma substitute is of the first importance. The number of small molecules which would pass rapidly through the renal glomeruli should be small. At the other end of the scale the number of very large molecules, which are mainly responsible for the increased erythrocyte sedimentation rate observed after the transfusion of most plasma substitutes, for the interference with cross-matching, and probably also for the tissue changes seen after the injection of some of these substances, should also be small. In order to obtain the greatest colloid osmotic effect, most of the molecules should be similar in size and shape to those of plasma albumin.

The composition from batch to batch should be constant within narrow limits. The bulk preparation of substances of this type is complex, and wide variations from batch to batch may occur unless the process is carefully controlled and standardized. For these reasons it is also clear that the molecular composition of a solution of a given substitute made in one county may differ, perhaps greatly, from that made in another county, depending upon the method of preparation and specification adopted. A substitute should possess certain other positive qualities: the solution should be stable during storage without refrigeration; it should normally be capable of being sterilized by autoclaving; it should be crystal clear so that contamination or other changes can easily be detected; and it should be fluid at temperatures above 0° C.

Negative qualities.—The substitute should not be antigenic. Any substance which causes sensitization should obviously not be injected into the body.

It should not be toxic locally or generally: for example, injection of the substitute should not cause thrombosis or thrombophlebitis, or tissue

necrosis if it escapes from the vein, nor should any general ill-effects, such as fever, ensue.

It should not cause permanent histological changes, nor should it be retained in the tissues for long periods. Ideally the substitute should be completely eliminated from the body at a rate which will allow its persistence in the blood stream until its place has been taken by the normal proteins. In practice, some substitutes are eliminated so quickly that their effect is not greatly superior to that of saline, and others persist in the tissues for shorter or longer periods after they have disappeared from the blood stream. Histological changes have been described after the injection of many of the materials used as substitutes, but their significance is not always clear.

It should not act as a diuretic and should cause no increase, or a slight increase only, in erythrocyte sedimentation rate. Nearly all the substances which have been, or are, used as plasma substitutes cause an increase in erythrocyte sedimentation rate and rouleaux formation because of the shape and size of the molecules. This effect can be reduced by eliminating the large molecules, but its abolition is impossible in most instances unless the molecular size is reduced to such an extent that the colloid osmotic pressure exerted by the solution is greatly reduced. Theoretically, the shape of the ideal plasma substitute molecule should be similar to that of albumin; the molecules of most of the substitutes are thin and elongated, whilst those of albumin are more or less globular.

The practical significance of rouleaux formation lies in the difficulty which may be occasioned when examining the serum of a patient for agglutinins; if the serum contains a sufficiently great concentration of the substitute, rouleaux may render the detection of agglutinated red cells difficult or impossible, so that a satisfactory cross-matching test cannot be done. For this reason it is a good rule to withdraw a sample of blood from the patient before giving a plasma substitute. The blood group of a patient who has received a plasma substitute, on the other hand, can be determined without difficulty if the cells are well washed before testing.

As might be expected, none of the substitutes yet used possesses all the positive and negative qualities of the ideal substitute which have been described.

USE OF PLASMA SUBSTITUTES

Plasma substitutes should be used with discretion. They do not contain hæmoglobin (with the exception of hæmoglobin solution, which is still in an experimental stage), antibodies, or clotting factors, and they have little or no buffering power. Apart from gelatin, none of them contains protein. They should not be transfused in place of blood, if blood is available, and they are not substitutes for plasma in the sense that they possess all the qualities of plasma. They resemble plasma chiefly in that their colloid osmotic pressure and viscosity are similar to those of plasma, and they will therefore restore a depleted blood volume. Plasma substitutes should be

regarded mainly as agents for the restoration of the blood volume when this has been reduced by hæmorrhage, or by loss of plasma as in burns or crush injuries; but because they lack many of the qualities of the natural transfusion fluids, and because it is not yet known precisely how they are eliminated from the body or whether, in certain instances, they are totally eliminated or not, they should generally be given in conjunction with blood or plasma, or both. If the volume of the transfusion is small, e.g., 1 litre, and blood or plasma is unobtainable, the transfusion may be completed with plasma substitute.

Experience in the 1939-45 war amply confirmed that restoration of the blood volume by transfusion after *hæmorrhage* or *trauma* was the only successful means of resuscitation, and that plasma and blood in the ratio 2:1 could be used. The relative excess of plasma tended to cause anæmia by hæmodilution, and subsequent blood transfusion was often needed to bring the hæmoglobin concentration to normal. It was also shown that the resuscitation of casualties of these types was better if blood, or mainly blood—for example, blood and plasma in the ratio 2:1—were used. The higher hæmoglobin concentration thus obtained stood the patient in good stead during anæsthesia and if infection occurred. As a general rule it may be said that when plasma substitutes are used in the treatment of hæmorrhage, not more than 2 to 3 bottles (each of 500 ml.) should be given to the average adult; if further transfusion is necessary, blood should be given.

In treating *burns*, patients in whom the blood volume is reduced by plasma loss during the first thirty-six to forty-eight hours, quantities of fluid greater than the normal plasma volume may have to be transfused. In this country the plasma substitute, dextran, has probably been used for the treatment of burns more extensively than any other substitute, and Bull (1952) has reported that such patients, if given dextran in an amount equivalent to the normal plasma volume, followed by plasma if more fluid is still needed, do as well as those transfused with plasma only.

Plasma substitutes find their main use when blood or plasma cannot immediately be obtained, or when only limited amounts of blood or plasma are available, or in places where there are no transfusion services. In times of national emergency plasma substitutes are likely to be used in large quantities. They would be of particular value in treating *flash-burn casualties* caused by atomic weapons. In such circumstances it would probably not be possible to use them in the somewhat restricted and cautious fashion advised above.

Plasma substitutes have also been used in the treatment of *nephrosis;* their value is not yet established.

TYPES OF PLASMA SUBSTITUTES

At the present time most attention is being paid to solutions of dextran, gelatin and polyvinylpyrrolidone. Gum-saline is still used to a limited

extent. No mention will be made here of bovine serum, isinglass and pecten, which have been used in the past, or of okra and polyglucose, which are in the earlier stages of investigation, or of hæmoglobin solution, which has been used both in this country and the United States, but only to a very small extent, and the preparation of which is still being investigated and improved.

Dextran is a carbohydrate polymer, synthesized from sucrose by an exocellular enzyme produced by certain organisms of species *Leuconostoc*. The crude dextran is depolymerized to a suitable molecular size by hydrolysis, and further refined by fractional precipitation of the large and small molecules. Like most of the other substances used as plasma substitutes it is polydisperse. The refined dextran is dissolved to make a 6 per cent. solution in physiological saline, and is sold in England under the names 'intradex' and 'dextraven'. Solutions of this kind have been widely used in Sweden, where dextran was first used as a plasma substitute, and also in England (Bull *et al.*, 1949), on the Continent and in the United States. Dextran possesses most of the desirable qualities of a plasma substitute, and has the possible advantage that it is composed of a substance which is not foreign to the body.

Although the dextran molecule consists of glucose units linked by a chemical bondage which is resistant to hydrolysis by any of the known enzymes found in the body, experiments with ^{14}C-labelled dextran in man and animals have shown that dextran is slowly broken down in the body (Pulaski, 1952). The larger molecules are temporarily stored in the reticulo-endothelial system and other tissues. Histological changes have not been observed in the tissues of animals given excessively large doses of dextran solution. The clinical use of dextran has given satisfactory results, especially in patients with burns (Bull, 1952), and the solution is now fairly widely used in this country. In an analysis of reports on 1,647 patients who had been given infusions of one type of dextran solution, I found that 31 patients (1.88 per cent.) had exhibited reactions. Approximately half of these patients showed febrile reactions, which were not of great significance, or made complaints of pain in the head or loins (Maycock, 1952). The remaining 15 patients (0.91 per cent.) exhibited urticarial or other types of allergic reaction. Among these were 9 instances of mild generalized urticaria; one patient developed œdema of the eyelids, and another patient vomited and complained of severe headache for a week after receiving the dextran. The other 4 patients showed a more severe type of reaction, characterized by vasomotor collapse, profuse sweating, cough, cyanosis and vomiting. The general incidence of reactions following infusion of this type of dextran solution was similar to that observed after the use of whole blood. At present there is no satisfactory explanation of the severer type of reaction which has been observed. Possibly the patients who reacted in this way had been sensitized by organisms of the leuconostoc group, or by antigenically related organisms.

Gelatin was first used as a plasma substitute in the United States in 1915, but it was not until the 1939-45 war that any real interest was shown in this substance as a plasma substitute. Solutions of gelatin prepared from bones and certain skins have been used with some success in America. The gelatin is rapidly excreted from the circulation by the kidney, so that its effect in restoring the blood volume is short lived. Two types of solutions have been mainly used, which differ in respect of the degree of hydrolysis to which the gelatin has been subjected in order to reduce its molecular weight to the desired range. The solution of gelatin with the larger average molecular weight, which is the more effective of the two, suffers from the disadvantage that it is not fluid at room temperature; the other solution gels at 12 to 15° C. Recently two new forms of gelatin, oxypolygelatin (gel point of 6 per cent. solution 10 to 13° C.) and 'fluid gelatin' (gel point of 6 per cent. solution 0 to 4° C.) have been produced and their value as plasma substitutes is being investigated. Gelatin and its derivatives have not been used as plasma substitutes in England.

Gum-saline is usually prepared as a 6 per cent. solution of purified gum arabic in physiological saline solution. This solution possesses many of the qualities already discussed and has been widely used since the 1914-18 war. Since 1934, however, gum-saline has largely fallen out of favour because deposits of gum may be found in the liver, bone-marrow, spleen, lymph glands and other organs, because traces of gum may be found in the blood as long as three years after injection, and because the solutions may cause severe reactions unless the crude gum is carefully selected and prepared. Anaphylactic reactions have been reported.

Polyvinylpyrrolidone (*P.V.P.*) is a water-soluble polymer of vinylpyrrolidone, which is made from acetylene and formaldehyde, and sold as a 3.5 per cent. solution under a number of names, e.g., 'periston' (Germany), 'subtosan' (France), 'plasmosan' (England). Polyvinylpyrrolidone which had recently been synthesized was selected from among many substances by Hecht and Weese in Germany as a plasma substitute at the beginning of the 1939-45 war. At that time the need for a plasma substitute in Germany was urgent because a satisfactory transfusion service did not exist, and subsequently polyvinylpyrrolidone was widely used in Germany and German-occupied countries, with apparent success. In this country, Arden *et al.* (1951) have recently reported a series of 37 orthopædic cases in which polyvinylpyrrolidone was given successfully, during or after operation, to maintain or restore the blood pressure.

The 3.5 per cent. solution, which is customarily used as a plasma substitute, possesses many of the desirable qualities already outlined: its colloid osmotic pressure and relative viscosity are similar to those of plasma; it is not antigenic or toxic; it is stable during storage. Polyvinylpyrrolidone, however, is a substance which, like gelatin and gum-arabic, is foreign to the human body. The average molecular weight of polyvinylpyrrolidone in the

commercially produced solutions is somewhat below that of albumin, and excretion into the urine is therefore comparatively rapid. The fate in the body of those molecules which are too large to pass the glomerular filter is not known. The tissues of animals which have received large doses of the solution containing polyvinylpyrrolidone of a small average molecular weight show no lasting histological changes (Thrower and Campbell, 1951). On the other hand, Schoen (1949) has reported changes in the tissues of infants given polyvinylpyrrolidone similar to those seen in animals receiving large doses of the drug (Ammon and Müller, 1949). Whether the polyvinylpyrrolidone used by Thrower and Campbell was closely similar to that used by the German authors is not clear, nor is the significance of the histological changes known: for example, no abnormalities were found by Barfuss and Eichler (1949) in the liver function of rabbits following the injection of very large doses, although the livers contained many foam cells. Experiments using polyvinylpyrrolidone labelled with ^{14}C or ^{131}I seem to show that polyvinylpyrrolidone molecules with molecular weights greater than 31,000 are stored in the body (Pulaski, 1952).

CONCLUSION

Plasma substitutes have an important part to play in transfusion therapy, especially in places where transfusion services are not highly developed, or are lacking, or during the temporary absence of blood or plasma, or in times of national emergency. Properly used they can be invaluable in saving life, but by their very nature they cannot entirely replace plasma, and it is for this reason that they should be used with care. The relative merits of the newer plasma substitutes mentioned cannot yet be assessed with certainty. They appear to meet the ideal discussed in this article more closely, in one way or another, than the many other substances tried previously.

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REVISION CORNER

THE SIGNIFICANCE OF PYURIA

THE presence of pus cells in the urine is abnormal and always requires investigation. A moderate amount of pus will make the urine visibly turbid, but a small though significant number of pus cells can be present in macroscopically clear urine.

EXAMINATION OF THE URINE

Pus cells are best observed by *microscopic examination* of a drop of urine, preferably from a centrifuged deposit, using either a one-third or one-sixth inch objective; they appear as round cells with a fairly large lobed nucleus. The nuclei may be made more visible by the addition to the urine of a drop of acetic acid. The *chemical tests* for pus are not sensitive, are open to many fallacies, and only detect pus when it is present in sufficient quantity to cause an obvious turbidity of the urine. If facilities for microscopic examination are not available, the best that can be done is to observe the effect on turbidity of heat and acetic acid. A turbidity due to urate crystals disappears on warming, and turbidity due to phosphate crystals clears up on addition of acetic acid. Turbidity due to pus is not affected by either of these procedures.

The presence of *crystals in the urine* does not indicate any disease of the urinary tract and if they appear only after the urine has been passed they are of no significance; if crystals are precipitated within the urinary tract they may damage the epithelium and may cause red cells and pus cells to be present in the urine. Crystalluria may set up quite severe colic or cause mild dysuria and frequency of micturition. Crystals are the bricks from which calculi are formed, and therefore anyone who habitually passes crystals in the urine may subsequently develop a calculus.

To determine from which particular part of the urinary tract pus is derived it may be necessary to examine specimens of urine collected separately from the bladder and each kidney, but Swift Joly in 1935 suggested a method which does not involve the passage of instruments, and which can give considerable help in localizing the lesion. The anterior urethra is washed out and a specimen collected. The patient is then asked to pass urine but not to empty the bladder completely. This carries away pus or debris from the posterior urethra. The prostate and seminal vesicles are then massaged and their contents expressed into the urethra. The patient then passes another specimen of urine which contains the secretion of these glands. Finally, the last half ounce or so of urine from the bladder is passed into another glass. From a microscopic examination of each of these specimens it is possible to decide whether the pus is derived from the anterior or posterior urethra, from the prostate, or from a higher level in the urinary tract.

CAUSAL FACTORS

In this country the most common cause of a pyuria due to an inflammation of the anterior urethra is no longer a gonococcal urethritis but a *virus infection* causing 'non-specific urethritis'. The urethral discharge of this disease differs from a gonococcal discharge in that it is more watery, less profuse, and more translucent. The incubation period is longer, usually about three weeks. Treatment of this virus infection is difficult and prolonged though 60 to 70 per cent. of cases

respond to aureomycin. The increased incidence of non-specific urethritis is probably more apparent than real and is due to the rapid cure of gonococcal urethritis by chemotherapy or antibiotics.

The normal urinary tract is highly resistant to infection and it is probable that if a culture of organisms were introduced into the healthy tract only a very transient infection would occur and the urine would be sterile within a few hours; if, however, any pathological condition were present, such as a calculus, diverticulum, or residual urine, a severe infection would develop which would not clear up until the underlying pathological condition had been successfully treated. It follows from this that whenever an infection of the urinary tract occurs it should be assumed, until the contrary is proven, that there exists an underlying predisposing cause of the infection. From time to time an acute cystitis occurs both in men and women which responds dramatically to treatment and for which no predisposing cause can be found, but more usually urinary infection is associated with urinary pathology.

Organisms pass through the intestinal mucosa and reach the blood stream in all individuals from time to time—but probably more frequently in the chronically constipated. These organisms are subsequently filtered through the renal glomeruli and reach the urinary tract; if an abnormality exists, an infection will follow, but if the urinary tract is healthy the organisms will be voided in the urine without causing a clinical infection and without producing a pyuria. The infected cervix or vagina is another source from which organisms may reach the bladder, either by retrograde spread along the urethra or by lymphatic spread to the bladder base. Close contact between an inflamed pelvic viscus and the bladder is an occasional pathway of infection.

The presence of organisms in a specimen of urine without pus cells is of no significance and means no more than that the urine was contaminated during collection.

The presence of pus cells, on the other hand, is always indicative of urinary disease, and if organisms can be seen on microscopy or grown on a culture medium it remains only to determine the site of the infection and to confirm or exclude an underlying and predisposing abnormality. If, however, pus cells are present but no organisms are seen on microscopy or grown on culture it is equally certain that disease is present and further investigation is needed.

A *calculus*, in the absence of infection, may set up a foreign body reaction in the epithelum with the production of pus cells. The urine of an acute infection which has responded to chemotherapy or one of the antibiotics may contain pus cells and no organisms; presumably the organisms have been eliminated but the pus cells persist until all the inflammatory exudate has been cleared, and until the affected epithelium has regenerated.

Urinary *tuberculosis* is the most serious of the conditions which, on routine examination of the urine, show pus cells not accompanied by organisms. The possibility of a tuberculous infection should always be considered when urine examination reveals the presence of pus cells but no bacteria are found in the gram-stained films, and cultures on ordinary laboratory media are sterile. Such a finding is an indication for a special search for tubercle bacilli. The tubercle bacillus is the only pathogenic acid-fast organism likely to be present in the urine, although there are several non-pathogenic organisms having this characteristic, the most common of which is the Smegma bacillus. Therefore if acid-fast

bacilli having the typical morphological characters and staining reactions of tubercle bacilli are found in a film in association with pus cells, then as a general rule no further tests are necessary and the diagnosis may be considered to be established. If acid-fast bacilli in a suspected urine are not found, or are present but are not quite typical in microscopic appearances, a culture should be prepared on one of the special egg media. If after incubation for three or four weeks the culture tubes do not show the presence of any typical acid-fast bacilli, this is valuable evidence against a tuberculous lesion. Guinea-pig inoculation is the final court of appeal in tuberculosis, but it should not be resorted to unless the other methods of decision have failed. It is an extremely reliable test but is expensive and takes at least six weeks to complete. Pyuria is a most significant finding and can never be safely disregarded.

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THE TREATMENT OF EPILEPSY

THERE are two aims in the treatment of essential epilepsy: (i) the general instruction and guidance of the patient and relatives with the object of helping them to adapt to the limitations imposed by the epileptic predisposition and to guard against its inherent dangers; (ii) the control of the seizures themselves.

GENERAL TREATMENT

It should be made clear at the outset to adult patients and to the parents of epileptic children that the purpose of treatment is not cure, but the control of an epileptic tendency which is permanently present. Some slight encouragement should, however, be permitted in that there is a spontaneous tendency for the fits of essential epilepsy, in particular those of *petit mal*, to lessen with increasing age.

The greatest emphasis should be laid on the fact that epileptics are normal members of the community and that with very few limitations they should be encouraged to engage in all normal activities. A tendency toward introspection and a feeling of inferiority are easily fostered in the epileptic and should be most actively discouraged.

A regular habit of life is indicated, and undue fatigue should be avoided. Regular bowel action is important and the rapid ingestion of large quantities of fluid should be prohibited.

School children should engage in all normal school activities with the exception of swimming, climbing and gymnastics. Cycling is inadvisable but cannot easily be banned for the well-controlled epileptic. Adults should be similarly restricted and, of course, they are prohibited by law from driving a motor car or motor cycle. Occupations involving unguarded machinery or work at heights should be avoided. In the home, serious accidents can be prevented by the provision of suitable strong fire-guards.

DRUGS IN THE CONTROL OF ATTACKS

Grand mal.—In the majority of sufferers the control of major epileptic attacks is relatively simple, and by suitable adjustment of the dosage of drugs relative

freedom from attacks can be expected. *Potassium* and *sodium bromide*, the mainstays of treatment in the last century, are now seldom used owing to the inconvenience of 'medicine' and the occurrence of cutaneous rashes and bromism.

The two drugs in most common use in the treatment of *grand mal* are *phenobarbitone*, which acts as a general cerebral depressant and sedative, and the *hydantoinates*, which are said to act by depression of the epileptic process directly. It is therefore thought that an attack occurring in a patient treated with hydantoinate alone is likely to be very severe, and that for this reason it is advisable to combine preparations of this type with those having an additional sedative effect, such as the *barbiturates*.

Initial treatment should consist in the administration of a relatively small dose of *phenobarbitone*, ½ to ¾ of a grain (32 to 48 mg.) twice daily, together with *sodium diphenyl hydantoinate* ('phenytoin', 'dilantin'), 1½ grains (0.1 g.) twice daily, the dosage being somewhat smaller for children under five years of age. It is inadvisable to administer hydantoinates to children under the age of three years. The dose of this combination of drugs may be slowly increased until reasonable control of attacks is achieved. Toxic manifestations often appear if the dose of diphenyl hydantoinate exceeds 6 grains (0.4 g.) daily. Phenobarbitone in doses greater than 4 grains (0.25 g.) daily is likely to have too pronounced a sedative effect. Should the maximum dose be reached without satisfactory control of attacks, a change to *methyl-phenyl-ethyl-hydantoin* ('mesontoin') may bring about improvement, the maximum dose of this preparation being in the neighbourhood of 9 grains (0.6 g.) daily.

Toxic effects of the hydantoinates may occur, usually in the first two months of treatment, and may appear as a morbilliform eruption, gingivitis, gastro-intestinal disturbance or, more rarely, vertigo with nystagmus and, on occasion, mental confusion.

Petit mal is much less easily controlled than grand mal. Phenobarbitone in moderate dosage often reduces the number of attacks; the hydantoinates are of no benefit. Recently, new preparations, *trimethyloxazolidine 2:4-dione* ('tridione') and *3-allyl-5-methyloxazolidine 2:4-dione* ('malidone') have proved more specific remedies. Both preparations require caution in their administration, and a small initial dose is advisable, such as 0.15 g. twice daily for a child of twelve, increasing slowly to 0.3 g. thrice daily, if necessary. For the first few months of treatment a fortnightly white-cell count is advisable, the chief danger of these preparations being neutropenia; impending fall in the total granulocyte count is sometimes heralded by a rise in the eosinophil cells. 'Tridione' may also cause photophobia, and both 'tridione' and 'malidone' may give rise to skin eruptions, restlessness or drowsiness. Both tend to increase the frequency of *grand mal* attacks.

Psychomotor seizures usually respond to phenobarbitone in moderate dosage.

It is thus clear that the treatment of major epilepsy is by no means the same as that of minor epilepsy, and that a definite diagnostic distinction must be made. Therefore in cases of doubt the patient should undergo electroencephalography.

STATUS EPILEPTICUS

Occasionally, and usually as a result of the patient's own neglect of treatment, status epilepticus occurs. In this condition the patient passes from one fit to the next without intervening return of consciousness. It is not generally realized that this is a dangerous condition with a mortality in the region of 30 per cent.

Intensive active treatment is essential. A rapid-acting sedative should be given, such as thiopentone sodium, 0.5 g. intravenously, the injection taking not less than three minutes. Immediately after this, paraldehyde, 5 ml., should be given by deep intramuscular injection. Very heavy sedation is needed thereafter for at least forty-eight hours, and in view of this and the difficulty in controlling fluid and electrolyte balance, the patient should be moved immediately to hospital.

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NOTES AND QUERIES

Choice of Antibiotic in Meningitis

QUERY.—What is the modern recognized treatment of: (a) Influenzal meningitis; (b) *Ps. pyocyanea* meningitis; (c) *B. coli* meningitis; (d) *B. proteus* meningitis; and (e) *Strep. fæcalis* meningitis?

REPLY.—For influenzal, *B. coli* and *Ps. pyocyanea* meningitis, unquestionably the most active antibiotic at the present time is 'polymyxin E', but it is not commercially available. Your reader will find a description of eight cases, the method of their treatment and dosage, described by Swift and Bushby in the *Lancet*, 1951, **ii**, 183. Seven of these patients recovered with, at most, mild sequelæ. Second best lines of treatment are streptomycin and a sulphonamide, aureomycin or chloramphenicol, but these agents cannot be relied upon to control *Ps. pyocyanea* or even, in some cases, *B. coli* infections.

For proteus infection there is no very satisfactory solution. One patient has had his life prolonged by treatment with streptomycin. It is also possible that chloramphenicol might be useful, for, though I have no record of a clinical trial, tests of some of this species show the organisms to be sensitive, and the drug has been given intrathecally without ill-effect.

For *Streptococcus fæcalis* the recognized treatment for some years has been large doses of penicillin; and streptomycin within the limits of reversible toxicity.

LADY FLOREY, M.D.

Tongue-Tie and Speech Defect

QUERY.—I have a patient, aged three years, who has a speech disorder which is ridiculed by older children and is therefore beginning to upset her. She pronounces 's' as 'h', e.g. 'socks' is pronounced 'hocks'. Her speech is otherwise normal. She has a very tight frænum linguæ and can only protrude the tongue about $\frac{1}{8}$" beyond the incisor teeth. I would like to know: (1) Whether the frænum linguæ should be cut?; (2) whether speech therapy is indicated, or whether spontaneous cure can be anticipated? Her parents are sensible people.

REPLY.—It would probably be wise to have this child's frænum linguæ cut. Once this is done speech therapy should not be necessary. In a baby it is unnecessary to do anything when the frænum comes to the end of the tongue, because in young infants the tongue has only to act as a piston going up and down against the hard palate. When the child begins to take solids, the functions of the tongue change. If there has been no tip beyond the frænum, one will usually grow in the middle of the first year. Rarely, the tongue-tie persists and has to be cut. If the frænum is put on the stretch by putting the tongue up and backwards and is then nicked with scissors, the remainder of the frænum may be torn or cut backwards. It is unlikely that any grafting will be necessary.

R. C. MACKEITH, D.M., F.R.C.P.

The Treatment of Vitiligo

QUERY.—A patient of mine has been suffering for some years with leucoderma (vitiligo). The chemist told her that there was a new cure for her complaint, and that she should see me about it. I have looked everywhere for this cure, and have also consulted my colleagues, but nobody seems to have heard of it.

REPLY.—Much is becoming clear about pigmentation of the skin. The present state of our knowledge has been clearly set forth by Professor J. H. Burn in the December 1951 number of the *British Journal of Dermatology*. But vitiligo is still in the stage of interesting theories. From time to time unsatisfactory attempts at its treatment have been made with many preparations; oil of bergamot, ultra-violet light, pantothenic acid, ascorbic acid, *para*-aminobenzoic acid, hypophyseal extract ('intermedin'). Recently there has been experimental interest about the use of extracts of a plant which goes by the unlikely name of *Ammi majus Linn.* This

plant has been known to the Egyptians since the thirteenth century as of some value in treating vitiligo. Certain Egyptian doctors have now promoted it, from being a tradition, to the scientific journals. This plant, they found, contains two crystalline bitter substances, ammoidin and ammidin. Treatment with these substances, given by mouth and locally, together with sunlight, has been found to improve vitiligo. Treatment schemes so far published in Egypt, France, and the United States, where the possibilities are being further explored, have resulted in uncomfortable but not serious toxic effects. Return of pigment to the involved areas may be complete—but not always so—and as long as four months' treatment may be needed. It is not yet known whether 'cure' is permanent.

The treatment is still in that well-known state of being worthy of further study. Biochemical investigation of these and allied substances gives hope to sufferers from vitiligo that something to relieve them may soon be available. No such substances are at present on the market in this country and the matter should be regarded with balanced but not obstinate conservatism.

DAVID I. WILLIAMS, M.B., M.R.C.P.

Ascaris Infestation

QUERY (from India).—Our Aboriginal Indians have a very high infestation rate of ascaris. In this famine area the scarcity of food means that the half-starved children grub around and put anything in their mouths which they think may have food value. This and the indiscriminate use of any bit of ground as a latrine have increased the roundworm infestation enormously during the last few years. With santonin costing about £1 a drachm (4.4 g.), and oil of chenopodium around £4 10*s*. for 8 ounces (228 ml.), the problem of treatment is a difficult one when dealt with on a large scale, and presents a serious problem in a financially precarious jungle hospital. Can you suggest alternative forms of treatment?

REPLY.—In addition to the two drugs mentioned (santonin, and oil of chemopodium) there are others effective in ascariasis which might be considered, e.g. carbon tetrachloride, tetrachlorethylene, hexylresorcinol; and recently, hetrazan has been advocated, although in this instance it would be wise to experiment in a few cases before ordering the drug in bulk. An estimate of the comparative costs, having regard to the effective dosage and course, could be obtained from the representatives in India of manufacturing firms. The cost of santonin quoted in London for export, 'free-on-board', is 69*s*. per ounce, and of hetrazan, as 'banocide', 91*s*. 2*d*. per 1000 tablets. It might be worth while to inquire about any folk remedies available locally, like pounded pumpkin seeds in tæniasis. (For example, the Irish Folklore Commission found that penicillin, in the parent fungus form, has been long used by 'wise women' in remote parts of Ireland as an application for wounds.)

Whatever specific treatment may be adopted, the disease cannot be stamped out unless latrines are provided and used in such a way as to prevent pollution of the soil. It is of little permanent benefit if a subject of this infestation is freed of his load of ascaris, and immediately proceeds to replace the expelled parasites by others, so that there is a regular sequence of 'parasites lost, and parasites regained'. When it is remembered that a single female ascaris may produce 200,000 eggs a day, the number passed by a heavily infested population may be imagined. The eggs may remain viable in the soil for years.

GENERAL SIR WILLIAM MACARTHUR, K.C.B., D.S.O., M.D., F.R.C.P.

Combined T.A.B. and Tetanus Toxoid Injections

QUERY.—Is it true that recent investigations have disclosed that separate injections of T.A.B. vaccine and tetanus toxoid confer a higher degree of immunity than combined inoculation of these prophylactics?

REPLY.—So far as I am aware there is no published evidence that separate injections of T.A.B. vaccine and tetanus toxoid give better immunity than injection of mixtures of these prophylactics. In fact it has usually been claimed that mixtures are more efficient than the separate components (Maclean and Holt, 1940; Ramon, 1951), although there is some evidence that this may not be true of all such mixtures. I imagine that your correspondent has heard some rumours which suggest that the addition of T.A.B. to tetanus toxoid destroys the antigenic efficacy. We suspect that this view is based on unsatisfactory flocculation tests (always a difficulty in testing tetanus prophylactics); our own experience does not confirm it.

Adequate tests of the antigenicity of the T.A.B. constituent of T.A.B.T. are not practicable in the laboratory, so that it is by no means easy to decide whether admixture of tetanus toxoid depresses the antigenicity of T.A.B.; all we can say is that T.A.B.T. (phenolized) has been used in the Canadian Armed Forces for over ten years and appears to have given entire satisfaction.

H. J. PARISH, M.D., F.R.C.P.ED.

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PRACTICAL NOTES

Isoniazid in Miliary and Meningeal Tuberculosis

THE results of an investigation of the effect of isoniazid in (a) 14 patients with acute miliary tuberculosis (four of whom also had tuberculous meningitis), (b) 11 patients with tuberculous meningitis (two of whom also had miliary tuberculosis), in whom the isoniazid was given either concurrently, or subsequent to, streptomycin, are reported by C. M. Clark *et al.* (*American Review of Tuberculosis*, October 1952, **66**, 391). The dosage of isoniazid was 10 mg. per kg. body weight daily for the first week, subsequently lowered to 5 to 7 mg. per kg. body weight daily. It is planned to continue treatment for twelve months. After a period of treatment ranging from three to six months, 12 of the patients in group (a) 'are alive with apparent remission of their infections and 2 have died, both from meningitis during the first week of isoniazid treatment . . . no evidence of meningitis has appeared in the patients who were free of this complication when isoniazid therapy was instituted'. A comparison of these results with those obtained in eight comparable cases of acute miliary tuberculosis treated with streptomycin (3 g. daily) shows a similar effect upon the temperature and the radiological picture, whilst the bacillary sputum count showed at the end of four months' treatment that in the streptomycin series three were still positive, compared with two of the nine isoniazid cases in which the sputum was originally positive. Exclusive of the four meningeal cases which complicated miliary tuberculosis, a total of six patients with tuberculous meningitis were treated with isoniazid alone: one of these died in the first week of treatment; one, who had not responded to streptomycin and was in status epilepticus, has shown no improvement after six months' treatment but is still alive; another, who had also been deteriorating on streptomycin, responded well; three, who had received streptomycin and in whom the only persistent abnormality was in the cerebrospinal fluid, have maintained their improvement. Of five patients with tuberculous meningitis treated with isoniazid orally and streptomycin intramuscularly and/or intrathecally, one died on the sixth day of treatment and the remainder are slowly improving after 31 to 43 days' treatment. The authors' summing up is as follows: 'It is unlikely that isoniazid will ever be used as the sole chemotherapy in meningitis . . . Nevertheless, there is reason to hope that the use of isoniazid orally and streptomycin by the intramuscular route might permit the elimination of the intrathecal use of streptomycin without sacrificing the maximally attainable antimicrobial activity within the central nervous system . . . A comparison of the uniformly satisfactory results in the isoniazid-treated uncomplicated miliary cases with the results previously obtained with streptomycin permits the inference that the antituberculous activity of isoniazid in man is equivalent, and probably slightly the superior, of the antituberculous activity of streptomycin'.

Withdrawal Effects of Cortisone and ACTH

ACCORDING to L. M. Taran and G. A. Gulotta (*Bulletin of the St. Francis Sanatorium*, October 1952, **9**, 1), the withdrawal effects in children with rheumatic carditis when treatment with cortisone or ACTH is stopped may be of serious consequence. Their conclusions are based upon the findings in 41 rheumatic children, aged six to sixteen years, who were treated with cortisone and ACTH because of 'their protracted carditis'. The therapeutic regime was: 300 mg. of cortisone orally every day for three days, followed by 150 mg. daily for three days, and then 100 mg. daily for fifteen days. The dose was then gradually tapered off over a period of seven days. Three weeks later ACTH was given: 100 mg. daily for three days, followed by 50 mg. daily for twenty-eight days. If there was no improvement a further course of cortisone was given after a rest period. In all, the 41 children received 58 courses of cortisone and 33 of ACTH. Sixty-one per cent. of the children showed definite withdrawal effects; these were more frequent with cortisone (in 58 per cent. of the 58 courses) than with ACTH (39 per cent. of the 33 courses). The withdrawal effects included pyrexia, tachycardia and a rise in the erythrocyte sedimentation rate. In addition, there were signs of worsening of the carditis and recurrence of joint pains. 'Of greater significance' was the fact that several children developed new rheumatic manifestations, e.g. two children with mild carditis developed acute arthralgia which they had never had before. 'Patients with severe total cardiac damage and incipient congestive failure as a rule showed severe withdrawal effects difficult to control and in several instances it was apparent that these withdrawal effects contributed to the downward progress of the illness'. The only way to control the withdrawal effects is to reinstitute treatment with cortisone or ACTH.

Oral Penicillin and Throat Flora

THE effect of the oral administration of peni-

cillin upon the bacterial flora of the throat has been investigated by M. A. Smith *et al.* (*American Journal of Clinical Pathology*, October 1952, **22**, 943) in 36 rheumatic children, all of whom had had an attack of rheumatic fever within the preceding five years, and all of whom were receiving oral penicillin routinely as a prophylactic measure. The dosage of penicillin was three 100,000-unit oral tablets daily—one 45 minutes before breakfast, one 1 or 2 hours after lunch, and one at bedtime. There was a control group of 34 children. Throat swabs were taken weekly during the period of investigation —January to April 1951. Positive cultures for beta hæmolytic streptococci were significantly less in the penicillin children (8 per cent.) than in the controls (28.2 per cent.). Hæmolytic streptococci were slightly more common in the swabs of the penicillin children (6.2 per cent.) than in the control children (4.5 per cent.). There was an increase in gram-negative organisms in the penicillin group—7 per cent. compared with 0.2 per cent. in the control group. There was no recurrence of rheumatic fever during the period of study.

Ventricular Extrasystoles after Exercise

At the Mayo Clinic a group of 21 patients who had ventricular extrasystoles after exercise was found in a series of 400 consecutive patients who had exercise tests. An analysis of these is given by R. H. Mann and H. B. Burchell (*Proceedings of the Staff Meetings of the Mayo Clinic*, September 24, 1952, **27**, 383). Ten of the patients had ventricular extrasystoles in the control electrocardiogram. The average age of these patients was fifty-two years, and two had hypertension. After exercise the frequency of extrasystoles was increased in seven cases, and remained the same in three. Of the former, only two had evidence of coronary insufficiency, and 'no apparent correlation was noted between increased frequency and coronary insufficiency'. Eleven of the twenty-one patients did not show ventricular extrasystoles in the control electrocardiogram. The average age of these patients was fifty-two, and four had hypertension. All eleven had ventricular extrasystoles in the record taken after exercise—occasional in seven and frequent in four, and all had signs of coronary insufficiency. In other words, 'the evidence in this study suggests that premature ventricular contractions precipitated by exercise are usually related to coronary insufficiency'. In view of the possible correlation between such extrasystoles and more serious ventricular arrhythmias, it is considered that 'an attempt to abolish premature ventricular contractions associated with coronary insufficiency would appear to be indicated'.

An Aid to the Induction of General Anæsthesia in Young Children

Under this title T. H. Seldon (*Proceedings of the Staff Meetings of the Mayo Clinic*, September 10, 1952, **27**, 371) describes an ingenious device by means of which the attention of young patients may be held during the induction of general anæsthesia. It comprises a whistle 'so constructed that it will fit into the exhalation side of a circle-absorption gas machine'. The pressure necessary to produce a sound from the whistle is about 1 mm. of mercury. No sound is created during inhalation, but the more effort that is exerted during expiration, the higher the

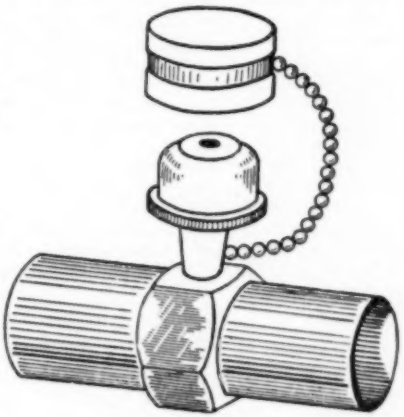

Fig. 1.—Whistle installed in the exhalation side of a circle-absorption gas machine, with plastic cap to silence noise when anæsthesia has been induced.

note of the whistle. A practical demonstration by the anæsthetist quickly arouses the interest of the small patient. Then a brief trial of the procedure is made using oxygen alone, with perhaps the little patient holding the anæsthetic mask on his own face. The patient's confidence is gained thereby, and during this time anæsthetic gases are added. When the patient has lost consciousness, the device can be removed from the machine or the whistle covered by a plastic cap, as shown in figure 1. The difficulty of induction of general anæsthesia in young children is well known and, as the author points out, 'any aids that can be devised to attract and hold a young patient's attention . . . are well

worthy of consideration', as forceful induction of anæsthesia in uncooperative patients 'is both psychologically and physically undesirable'.

Aureomycin in Mumps

TREATING alternate cases with aureomycin, LeRoy Homer and W. N. Donovan (*Journal of the American Medical Association*, October 4, 1952, **150,** 465) were 'unable to demonstrate that aureomycin had any beneficial effect in epidemic parotitis (mumps) or its complications'. There were 24 men, aged seventeen to twenty-five years, in each group, and the dosage schedule of aureomycin was 500 mg. four times a day for twelve doses if the patient was afebrile. In patients who continued to be febrile, or later developed febrile complications, aureomycin was continued, or begun again, in the same dosage until the temperature remained normal for twenty-four hours. The duration of glandular swelling averaged 8.1 days in the aureomycin group, and 9.3 days in the control group. The duration of pyrexia in the aureomycin group was 4.4 days, and 3.4 days in the control group. The duration of the illness and of the stay in hospital was similar in the two groups. Orchitis developed within twenty-four hours of admission to hospital in three of the aureomycin group and two of the control group, whilst it developed subsequent to the first day in hospital in six of the aureomycin group and three of the control group.

The Prophylaxis and Treatment of Mumps Orchitis

A PRACTICAL regime for the prevention and treatment of mumps orchitis is outlined by R. Crosnier (*Presse Médicale*, October 18, 1952, **60,** 1398). The prophylactic measures recommended are: (a) Absolute rest in bed for at least ten days, with the wearing of a suspensory bandage. (b) During the period in bed, diet is important: milk, purées, preserves; the daily intake of protein may with advantage be pushed to 70 g. and then to 100 g. (c) Specific prophylaxis in the form of intravenous injection of convalescent serum, 40 ml. for one or two injections; if the virus is found to be specifically orchitigenic the dosage should be doubled. It is essential that this prophylactic regime should be instituted during the first forty-eight hours of the infection, before fixation of the virus occurs. Synthetic œstrogens should be given on the first appearance of parotitis: stilbœstrol, 2 mg. for ten days; hexœstrol, 2 mg. for ten days; dienœstrol, 1 mg. for ten days. A ten-day course is better than a five-day course with higher dosage, and if the virus is particularly orchitigenic the course should be prolonged for fifteen days. In the experience of the author the administration of œstrogens is indispensable in the young adult. The same synthetic œstrogens are employed for the treatment of orchitis, but in higher dosage, i.e. 5 mg. for ten days for stilbœstrol and hexœstrol, and 3 mg. for ten days for dienœstrol. Infiltration of the lumbar sympathetic with a solution of novocain, 0.5 or 1 per cent., in dosage of 10 or 20 ml., bilaterally, is advocated as a prophylactic measure; and for treatment of unilateral orchitis, in dosage of 20 ml.; for bilateral orchitis the infiltration is doubled. Bed rest, as prescribed for prophylaxis, should be carried out with, in addition, immobilization of the scrotum.

Irradiation Cancer in Dentists

A SERIES of eight dentists with 'severe radiation damage' of the hands, leading to malignant change in five, is reported by F. E. Mohs (*Journal of the American Dental Association*, August 1952, **45,** 160). These changes occur in the fingers as a result of repeated irradiation by x-rays during the exposure of dental films. The most common sites are the thumb and the radial side of the index and middle fingers. The condition is usually bilateral, but the right hand tends to be involved more seriously than the left. The first change is usually a dryness and scaliness of the affected part, followed by mottled discoloration. Later, keratoses form, and there may be persistent ulceration and fissure formation. There may also be fissuring, followed by thickening, of the nails. Malignant change is recognized by 'a growing indurated mass or by progressive ulceration'. Histologically the tumour is a squamous cell carcinoma. The time interval between first exposure and the development of malignant change is very variable; the shortest period in this series was four years. Prevention consists in always insisting upon the patient or a relative holding the film in position during exposure. Treatment consists of local application of lanolin or olive oil for the dryness and scaliness when it first appears. Superfatted soap reduces dryness caused by frequent washing. Fissures, abrasions and ulceration are treated by producing a crust with mercurochrome, by dry protective dressings, or by dressings impregnated with scarlet red ointment. Keratoses are removed by electrodesiccation or by chemical cauterization, and the removed tissue should always be examined histologically for the presence of malignant change. When such change is present, excision is carried out by surgical, electrosurgical or chemosurgical methods. Radium or deep x-ray therapy must never be used for treatment.

REVIEWS OF BOOKS

The Clinical Application of Antibiotics: Penicillin. By M. E. Florey, M.D. London: Oxford University Press, Geoffrey Cumberlege, 1952. Pp. xiii and 730. Figures 115. Price 84*s.*

This book is a continuation of the two volumes on antibiotics by Sir Howard Florey and six collaborators which was published some three years ago and which dealt with the fundamental chemical and pharmacological properties of these important substances. The application to the clinical field of the vast amount of knowledge recorded in these books is now recorded by Lady Florey, who has herself contributed much to our knowledge of penicillin therapy. A further volume on the clinical use of antibiotics other than penicillin is in preparation.

The first three chapters deal with general considerations and summarize those properties of penicillin which are of clinical importance. It is a remarkable and fortunate fact that the first antibiotic to be discovered should have been so free from toxic effects, and the literature has had to be vigorously combed to produce a short chapter of 25 pages on conditions complicating penicillin treatment. The author has compiled some excellent composite charts which summarize the blood levels obtainable by different methods of administration of penicillin. The treatment of diseases due to specific organisms is dealt with in a series of chapters, which is followed by a section devoted to diseases of different organs and systems. Much of the information is given in summary form in specially compiled composite tables. The book is admirably illustrated and contains a bibliography of about 4000 references, as well as full author and subject indices. It can be confidently recommended to all practising clinicians whatever their specialty. The author is to be congratulated on having maintained single-handed the high standard set by the seven authors of the previous two volumes of the series.

Causes and Prevention of Tuberculosis. By Brice R. Clarke, M.D. Edinburgh: E. & S. Livingstone Ltd., 1952. Pp. viii and 288. Figures 13, tables 70. Price 32*s.* 6*d.*

The recent rapid development of new methods of treating tuberculosis—antibiotics, chemotherapy and surgery—has focused attention upon the therapeutic approach to the disease, so that a textbook emphasizing the much more important question of prevention is welcome. There is an introductory chapter which gives a foretaste of the book's outlines, and then tuberculin tests, the primary and later stages of the disease, the influence of race, heredity, nutrition and other environmental factors on the prevalence of the disease, are described in turn. Mortality statistics are considered under the title of 'epidemiology', a word which should really mean much more than this. The next three chapters on bovine tuberculosis, and the principles and practice of prevention, are for the most part a recapitulation and summary of the previous chapters. The practice of mass miniature radiography is described by Dr. J. Ritchie, director of the M.M.R. services in Northern Ireland—a useful chapter, except that the work of the Americans in showing the errors of film reading is described without mention of the techniques they suggest for reducing these errors. The last chapters deal with immunization by B.C.G. and vole bacillus, prevention of 'disease' in those already infected (which is largely recapitulatory), and finally, treatment and rehabilitation from the administrative rather than the clinical point of view.

The aim of the book is admirable, but the achievement is a little disappointing. It is hard to read, for the text is in the form of a condensed and uncritical abstract of the literature, packed with statistics, so that it reads more like a book of reference than the essay that it is intended to be. The book's chief value will be as a source of reference to the literature on tuberculous epidemiology, and it will be of undoubted value to many doctors concerned with the prevention of tuberculosis.

Œstrogens and Neoplasia. By Harold Burrows, C.B.E., Ph.D., F.R.C.S., and Eric Horning, D.Sc. Oxford: Blackwell Scientific Publications, 1952. Pp. xvi and 189. Price 30*s.*

The importance of this topic in human disease is, of course, obvious. The evidence is strong for the participation of œstrogens in the etiology of an important proportion of human cancer, particularly in women. That evidence, however, lies in a mass of experimental and clinical observations which most of us find difficult to disentangle and evaluate. We have reason to be grateful therefore to the authors for this excellent critical review of the literature, backed by the authority of their own important contributions to the subject. At the present stage of knowledge such a book can only be of the nature of an interim report, and the reader must not expect definitive conclusions on many of the problems raised. The participation of œstrogens has been put forward with varying degrees of

probability in the etiology of a wide range of human and animal tumours—from tumours of the uterus to subcutaneous sarcomas and leukæmias. The œstrogens, with their complex interactions with the other hormones, may be expected to prove a more difficult problem in carcinogenesis than the extraneous chemical carcinogens, and much of the work here reviewed is conflicting. For some of the tumours considered the evidence of œstrogenic participation is slight in the extreme, but the authors show a commendable refusal to ride the œstrogenic hobby horse too far, and review the evidence, slight or strong, with critical impartiality. Those with special interest in tumour pathology will want to have this book on their shelves for frequent reference. The general practitioner, if he is prepared to face a hazy picture of a landscape that cannot honestly be painted otherwise, should find it an interesting stimulus to the more inquiring observation of many cases of frequent occurrence in his practice.

Advances in Medicine and Surgery. From the Graduate School of Medicine of the University of Pennsylvania. Philadelphia and London: W. B. Saunders Company, 1952. Pp. xii and 441. Illustrated. Price 40*s*.

THIS volume represents a course of postgraduate 'educational renewal' given in symposium form at the Graduate School of Medicine, Philadelphia. The ten main subjects discussed comprise adrenocortical hormones, potassium, hypertension, preoperative preparation, thromboembolism, pulmonary infections, relief of pain, some aspects of cancer research, viral diseases, and psychosomatic disorders. The emphasis is medical rather than surgical, and the volume is directed towards the specialist in medicine who wishes to read reviews of the recent advances made in these subjects, each of which is discussed from differing viewpoints by four or five authors. Many of the articles are well-balanced reviews, containing little hitherto unpublished data but painting an instructive picture of recent work in the field. Others are less critically written and in places, particularly in the section on the adrenal hormones, there is a too ready willingness to suppose that the findings in animals are necessarily applicable to man. Perhaps one of the most outstanding sections is on viral diseases, in which Stokes reviews his recent work on infective and serum hepatitis, Sigel discusses the clinical syndromes associated with Coxsackie virus infection, and Henle describes recent advances in our knowledge of mumps and poliomyelitis.

In the section on hypertension, treatment by sympathectomy, subtotal adrenalectomy, low-salt and rice diets, and the use of antipressor agents are discussed. Here there is less integration, and the reader may wonder for what type of case each treatment is most applicable. In the section on pulmonary infection, McNair Scott gives an excellent account of virus and rickettsial diseases of the respiratory tract, and of the value of a diagnostic virus laboratory in establishing the diagnosis. The other articles in this section, dealing with pulmonary fungus infections, recent trends in the surgical treatment of pulmonary infections, and the chemotherapy of respiratory infections, are reviews of current practice.

Background to Hospital Planning. By H. W. C. VINES, M.D. London: Faber and Faber Limited. 1952. Pp. 188. Figures 26. Price 30*s*.

PROFESSOR VINES has chosen the title of this book with the same care as he has shown in writing the book. It has to do with the background of hospital planning and is only indirectly concerned with plans for hospitals. The size of the hospital is discussed, and on this controversial subject the 800 bed level is accepted as a reasonable maximum. The smallest economic unit is given as 200 beds, but a plea is made for much smaller hospitals serviced by general practitioners and visited by consultants. It is suggested that there should be three types of hospital: the acute general hospital, post-operative or convalescent hospital, and the long-stay hospital. Although special hospitals may be convenient from various points of view, it is maintained that the patient benefits from being in a hospital containing practically all the special services. If it is necessary to separate off any of the treatment areas of the hospital it might be reasonable to provide maternity with a building to itself. 'Apart from maternity, there does not seem any equally good case for the separation of any other skill without risking the mistake of disintegration'.

The book contains much useful discussion about services and communications. There is a strong plea for adequate lifts, these being regarded as vertical corridors, and for horizontal corridors used for special purposes so that they do not become blocked. There are discussions about chutes and pneumatic tube services, and methods of finding and communicating with individuals. There is full discussion on accessibility, arranging and planning out-patient and casualty departments; also on the arrangement of wards, and particularly a plea for much more generous provision of sanitary annexes and ancillary rooms. Operating theatres, pathology, x-ray and physiotherapy services are all dis-

cussed. There is a special chapter on the kitchen problem. The special problems of teaching hospitals have a chapter to themselves, and the last chapter is concerned with the next hundred years. Here Professor Vines suggests that less bed accommodation will be required, and much greater room for laboratory and other methods of investigation and for out-patient treatment will be needed.

This book is forcefully written; a certain amount of irony creeps through, and although to those who have been concerned in hospital planning many of the things will appear trite, it can do nothing but good to have them repeated. It is a pity that the price of the book should be so high.

The National Health Service. By Sir James Stirling Ross, K.B.E., C.B. London: Oxford University Press, Geoffrey Cumberlege, 1952. Pp. xiv and 398. Price 30*s.*

Sir James Stirling Ross had as much to do with the introduction of the Health Service Acts of 1948 as anyone in this country, and in the sober, balanced prose of Edinburgh University and Balliol at its best he has written an enthralling book. When the historian of the future delves back to see whence this Health Service grew he will find the whole story in this volume. The consciousness of 'something wrong' in the middle of the last century is shown to develop into the active discussions of the post-1918 era, culminating in the plans brought to action by the catalytic mind of Lord Beveridge during the last war. The growth of the Administration is faithfully portrayed: the attempts mostly successful, a few catastrophic, to reconcile conflicting interests are described without bias or rancour: and criticism, appearing unobtrusively from time to time, is constructive in conception if occasionally lacking in understanding. The quotations at each chapter head are a joy. But—and it is a very big 'but'—why no index? In future editions, of which there should be many, for the book is essential to all who would understand how the Health Service works, this omission must be remedied.

Fitness for the Average Man. By Sir Adolphe Abrahams, O.B.E., M.D., F.R.C.P. London: Christopher Johnson Publishers Ltd., 1952. Pp. 170. Price 10*s.* 6*d.*

In 1937, the Natio .al Physical Fitness Campaign was launched; in 1939 it died, to be partly reborn in 1941 with the Army Physical Medicine movement and the Commando battle school cry. Sir Adolphe in his most readable and legibly printed little book has attempted to set out the problems and answers to questions that arose as the result of this interest in general fitness and in the effect of physical endurance on the body. 'Fitness', he defines as 'that state of mental and physical well-being which enables a man to take his place as a citizen'. He considers that strenuous exercise in the early morning is bad; his table of burning up of fat on exertion on page 12 shows the futility of weight reduction by exercise. In the case of strenuous athletics he suggests that the peak age is twenty-three and a half, that they are not *physically* bad for the female, and that they do not affect longevity. Many will be surprised to learn, however, that focal sepsis plays a large part in the production of strains and sprains. The author has no competitor in the field of the medicine of athletics and, written in his usual perfect English, he has given us a useful little book that is a delight to read.

Surgery for Students of Nursing. By John Cairney, M.D., D.Sc., F.R.A.C.S. Christchurch, New Zealand: N. M. Peryer Ltd., 1952. Pp. 326. Figures 120. Price 40*s.*

This is probably the best book on surgery for nurses that has yet appeared; that at any rate is the opinion of two State Registered nurses related to the reviewer. The author is a well-known New Zealand surgeon, and the book represents his experience in delivering courses of lectures in surgery to nurses for more than twenty years. The illustrations are admirable; indeed any surgeon who is entrusted with the task of instructing students, whether of nursing or of medicine, in the principles of surgery would do well to study these simple drawings and learn from them the difficult art of pictorial exposition.

Dictionnaire Français-Anglais, Anglais-Français des Termes Médicaux et Biologiques. By Pierre Lépine. Paris: Editions Médicales Flammarion; London: H. K. Lewis & Co. 1952. Pp. 829. Price 63*s.*

This long-awaited French-English, English-French dictionary of medical and biological terms at last makes it appearance and is assured of a warm welcome. There has long been a need for such a dictionary, for the French language is full of pitfalls for the English translator, and *vice versa* for the French. This one is thoroughly up to date, well produced in good clear type, and the author has added descriptions of many items in the converse language, so that the work may be used as a standard medical dictionary. There is also a useful set of tables for conversion to the metric system.

NEW EDITIONS

Emergencies in Medical Practice, edited by C. Allan Birch, M.D., F.R.C.P., in its third edition, (E. & S. Livingstone Ltd.), has undergone careful revision. It thus remains the best book of its kind in this country. The author has been particularly fortunate in his twenty-one collaborators. All have concentrated on the practical aspects of their respective subjects, and the result is a book which can literally be described as essential for every practitioner. There are few, if any, medical emergencies which are not dealt with, and with this book on his desk the practitioner can rest assured that he will never be at a loss, no matter what may be the emergency. Typical of the care with which the book has been compiled is the beautifully simple method described for removing the 'fixed wedding ring'.

The Science and Practice of Surgery, Vol. 1 and 2, by W. H. C. Romanis, M.CHIR., F.R.C.S., and Philip H. Mitchiner, C.B., C.B.E., M.D., M.S., F.R.C.S., in its ninth edition (J. & A. Churchill Ltd., 32*s*., 36*s*.) has been completely revised and parts rewritten. The section on diseases of the eye, by C. L. Gimblett, which was omitted in the last edition, has again been included, and the chapter on anæsthesia has been revised by W. D. Wylie. In the new edition the authors' policy of 'inserting new material only when convinced of its real value and thorough establishment' has been adhered to so that the work may fulfil its function for use 'by the student both for his qualifying and postgraduate examinations, as well as a useful reference for the qualified practitioner'. The work, which is too well known to call for detailed criticism, has been brought up to date in all sections, and practitioners will value, among other things, the list of antibiotics with indications for their individual use. The production of the new edition well upholds the high standard of the publishers.

Logan Turner's *Diseases of the Nose, Throat and Ear*, edited by Douglas Guthrie, M.D., F.R.C.S., and John P. Stewart, M.D., F.R.C.S., in its fifth edition (John Wright & Sons, Ltd., 42*s*.) has been thoroughly revised and brought right up to date. It is well written, well illustrated and well indexed. In a work of this size, less than 500 pages, not every subject can be dealt with fully and this is realized and where necessary the fact is stated in the text. The section on ear diseases has always been famous, and certainly in the present edition it is as good as ever; but all the various sections are equally well done. It is a great pleasure to handle once again a new edition of this famous book.

Antibiotics: A Survey of Their Properties and Uses (Pharmaceutical Press, 25*s*.) is technically the second edition of 'Penicillin: Its Properties, Uses and Preparations' which was published in 1946. In practice it is a new book, and a very good one too. Published 'by direction of the Council of the Pharmaceutical Society of Great Britain', it is characterized by that love of meticulous accuracy which is the hallmark of the good pharmacist. The aim of the book is to provide an account for the practitioner and the pharmacist of the antibiotics now in general use, and this it successfully achieves. Manufacture, chemistry, standards and methods of assay, and clinical uses are all dealt with. In addition, there is a chapter on the use of antibiotics in veterinary practice. Two particularly useful chapters are those dealing with pharmacy and pharmaceutical preparations, and with commercial preparations. The chapter on clinical uses is by Professor A. Kekwick.

Scoliosis: Pathology, Etiology and Treatment, by Samuel Kleinberg, M.D., was first published twenty-five years ago, although the present edition (Baillière, Tindall and Cox, 57*s*. 6*d*.) has largely been rewritten. It is one of the few classics on the subject. The trouble is that there is little to be said on the subject, and the author's ingenuity has been taxed to fill 250 pages. He has succeeded by starting off with 35 pages of 'Anatomy, Embryology and Physiology', but one does not pay 57*s*. 6*d*. to read 'The spine, the ribs, the muscles of the back and the paravertebral tissues are so intimately related that they are interdependent', nor to gaze at a picture of a spirometer apparently contemporary with Lavoisier. Many of the abundant illustrations are sordid: girls with idiopathic scoliosis no longer wear button boots and canvas drawers. Those whom these deterrents have failed to discourage will now get to the meat of the book. The factual description of the deformity is apt and painstaking. The section on paralytic scoliosis is particularly worth while. That part on correction and operation are the most important because they represent accumulated knowledge. Unfortunately there is still an entity 'idiopathic scoliosis'.

BINDING CASES

Binding cases for this and previous volumes are available in green cloth with gilt lettering, price 5*s*. each, post free. The cases are made to hold 6 copies after the advertisement pages have been removed: they are not self-binding. Alternatively, subscribers' copies can be bound at an inclusive charge of 12*s*. 6*d*. per volume; this includes the cost of the binding case and return postage.

The contents of the January 1953 issue, which will contain a symposium on 'Indigestion', will be found on page lxxvi at the end of the advertisement section.

Notes and Preparations, see page 689
Fifty Years Ago, see page 693

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NOTES AND PREPARATIONS

NEW PREPARATIONS

'ALIMEX' is a combination of aluminium hydroxide and magnesium hydroxide (dried aluminium hydroxide gel, 7.3; magnesium hydroxide, 1.6; oil of peppermint, 0.02; vehicle to 100) which has been prepared for use in the correction of hyperchlorhydria and as an adjunct to the treatment of peptic ulcer. Advantages claimed are that 'it is pleasant to take, is not absorbed into the circulation and so cannot lead to systemic toxic effects or alkalosis, and is chemically astringent and demulcent'. Issued in bottles of 8 fl. oz., and in dispensing packs of 80 oz. (Boots Pure Drug Company Ltd., Station Street, Nottingham.)

'BROCKHAM HIGH PROTEIN FOOD', a crisp and palatable food supplement, consists of powdered brewer's yeast (20 per cent.), yoghourted skim milk (20 per cent.), molasses (35 per cent.), and wheat germ (15 per cent.). It is rich in protein and minerals, low in fat and starch, and has a high vitamin B content. It is not a breakfast food only, but in addition to its use as a cereal, or added to cereals, it makes a pleasant course served with fruit or milk pudding. and can be added to salads. (Brockham Food Laboratories Ltd., Acton Lane, London, N.W.10.)

'CARBO-RESIN' brand Sodium Removing Resins (alkylene polyamine resin (anion exchange), 12 per cent.; carboxylic acid resin (cation exchange), 59 per cent.; potassium salt of carboxylic acid resin (cation exchange), 29 per cent., is a mixture of ion exchange resins which is claimed to increase fæcal excretion of sodium in conditions in which there is abnormal retention of sodium by the kidney, such as chronic congestive heart failure, cirrhosis of the liver, and nephrosis. It may be used either in conjunction with mercurial diuretics, or alone. Issued as a powder (No. 71) in bottles of 1 lb. (Eli Lilly and Company Ltd., Basingstoke, Hants.)

'CYCLOSPASMOL B.S. 572' (spasmocyclone) is the mandelic acid ester of 3.5.5-trimethylcyclohexanol, which 'in addition to its spasmolytic activity . . . is a mild vasodilator. The use of 'cyclospasmol B.S. 572' is indicated in peripheral vascular disease. The drug has also been used in spastic conditions of the gastro-intestinal tract, gall-bladder and uterus. Issued in tablets, each containing 100 mg. (Camden Chemical Co. Ltd., 61 Gray's Inn Road, London, W.C.1.)

'OBLIVON' (3-methyl-pentyne-ol-3) is a new sleep-inducing product with a chemical structure distinct from that of the barbiturates. It is claimed that with 'oblivon' sleep is induced quickly and effectively, the drug is non-toxic and, as 'it is almost completely eliminated from the body within two hours', no 'hang-over' or cumulative toxicity occurs. Its use is indicated whenever quick induction of sleep is required. Issued in capsules containing 250 mg., in containers of 25 and 100. (British Schering Ltd., 229-231 Kensington High Street, London, W.8.)

'SANESCOL', contains dried extract of belladonna B.P., ½ grain; kaolin B.P., 2 g.; aneurine hydrochloride, 2 mg.; riboflavin, 1 mg.; nicotinamide, 5 mg.; and ascorbic acid, 5 mg., in 2 teaspoonfuls. It has been prepared for use in the conservative treatment of colonic infection, particularly mucous and ulcerative colitis. (H. R. Napp Ltd., 3 and 4 Clements Inn, London, W.C.2.)

PHARMACEUTICAL NOTES

CORTISONE ACETATE.—Bayer Products Ltd. announce the manufacture of cortisone acetate at their factory in West Molesey, Surrey. This is the first time that this drug has been produced in Britain. Supplies of cortisone acetate are distributed by the Ministry of Health to selected hospital centres so that the clinical evaluation can be carefully controlled. It is hoped that by the middle of 1953, production will allow an export surplus. Cortisone Acetate Bayer is issued in 25 mg. tablets for oral use. (Africa House, Kingsway, London, W.C.1.)

'DEXTRAVEN' is a new preparation of dextran now available after two years of research. This solution contains dextran of a clinically optimal range of molecular size, which on infusion results in maintenance of a maximal concentration in the circulation and minimal urinary excretion and leakage into the tissue fluid. (Benger Laboratories Ltd., Holmes Chapel, Cheshire.)

'LINGUETS'.—In an article by Dr. A. C. Crooke in the September issue of *The Practitioner* reference was made to the administration of methyl testosterone in the form of linguets. We have been asked to draw attention to the fact that 'Linguets' is the registered trade mark of Ciba Laboratories Ltd.

MEDICAL FILMS

A SERIES of six sound films entitled 'Some Aspects of Accessible Cancers', and comprising: (1) Skin (27 mins.); (2) Lip, Tongue and Mouth (24 mins.); (3) Larynx (26 mins.); (4) Breast (29 mins.); (5) Cervix and Uterus (35 mins.); and (6) Rectum (25 mins.), has been made for the Ministry of Health, and is now available for hire. Showing of the films, which

CONTINUED ON PAGE 699

are of a highly specialized character, is restricted to medical and other professional audiences, and applications should state the 'exact type of audience for which a show is requested'. (Central Film Library, Government Building, Bromyard Avenue, Acton, W.3; for Scotland: Scottish Central Film Library, 16-17 Woodside Terrace, Charing Cross, Glasgow, C.3; for Wales: Central Film Library of Wales, 48 Park Place, Cardiff.)

ANGLO-DANISH SANATORIUM SCHEME FOR BRITISH CHILDREN

THE National Association for the Prevention of Tuberculosis has undertaken to select tuberculous children from England, Scotland, Wales, and Northern Ireland, who will be treated free in Vordingborg Sanatorium, Zealand, Denmark, for six to twelve months. The Anglo-Danish Society has generously made itself responsible for the expenses. Recommendations will be accepted from the patient's family doctor or specialist physician. A joint meeting of members of the NAPT Council and its affiliated Care Committees, and of the Anglo-Danish Society was held in London on October 2, when Dr. Niels Sjørsley, Medical Director of the National Association for the Fight against Tuberculosis in Denmark, spoke on 'Denmark's Success against Tuberculosis: 1875-1952'. (NAPT, Tavistock House North, London, W.C.1.)

PUBLICATIONS

The Pocket Prescriber and Guide to Prescription Writing, by Alistair G. Cruikshank, F.R.C.P.ED., in its fifteenth edition, contains a number of new drugs which have come into official use since the appearance of the last edition in 1949. Some useful dosage charts for the administration of chloramphenicol are among the new features, and there is a good index to prescriptions for the different disease conditions. In his preface the author expresses the hope that 'the Pocket Prescriber may assist young doctors and perhaps some of their seniors to prescribe from the B.P. or B.P.C. and restrict as far as possible the use of proprietary drugs'. (E. & S. Livingstone Ltd., price 5*s*.)

The Collected Papers of the Mayo Clinic and the Mayo Foundation, edited by Richard M. Hewitt, M.D., *et al.* These papers, selected primarily for their interest to the general physician and surgeon, will prove of equal interest to general practitioners; they reflect the high standard of work at the Mayo Clinic. It is impossible in a brief review to select individual papers for comment; perhaps the outstanding section is that on the alimentary tract which includes interesting contributions on relapsing pancreatitis, postoperative results of gastric vagotomy, and studies of carcinoma of the colon. There are some pleasing contributions on surgical treatment of certain types of cardiovascular disease, and interesting and extensive studies of infective mononucleosis. Other contributions include an excellent account of the modern treatment of anæmias, and some interesting studies of prolapsed intervertebral disc syndromes. (W. B. Saunders Company, price 60*s*.)

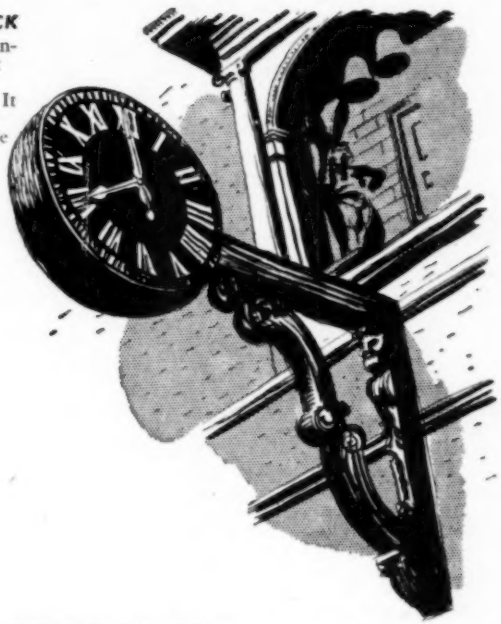
Primer on Alcoholism, by Marty Mann, fully describes the clinical features of alcoholism culled from the histories of thousands of alcoholics. The therapeutic approaches are described, including the methods of Alcoholics Anonymous in the United States, which are presented without excessive claims. No relative or physician who has watched the progress of the disease could deny its accuracy and restraint, and to those who embark on the exacting task of helping an alcoholic the book will be of real value. Every practitioner should have a copy of this book to recommend to the immoderate drinker who is in the mood to accept help. (Victor Gollancz Ltd., price 8*s*. 6*d*.)

A NEW chapter on 'class-work' with tables of exercises for different types of patients, and notes on the management of children's classes, and individual and group treatment of aged and chronic patients has been added to *Massage and Remedial Exercises* (in Medical and Surgical Conditions), by Noël M. Tidy, Member of the C.S.P.; T.M.M.G., in its ninth edition. Other new sections deal with spastic paralysis due to spinal cord injuries, varicose and other ulcers, adolescent kyphosis, pre- and post-operative treatment of gastrectomy, and lesions of the supraspinatus tendon. Although written primarily for the physiotherapist, this book should be of value also to the practitioner. (John Wright & Sons Ltd., price 27*s*. 6*d*.)

Die Frühdiagnose des Uteruscarcinoms (The Early Diagnosis of Carcinoma of the Uterus), by Professor Hans Limburg.—Now appearing in its second edition this work has become a small monograph on its subject. By the addition of some fifty pages it has been possible to incorporate the illustrations into the text and to give details of the various biochemical analyses of normal and pathological cells. It provides a good summary of its subject, has a useful bibliography, and can be taken as a standard expression of continental experience. As it is only two years since it first was published, it seems that the book has now estab-

CONTINUED ON PAGE 692

ST. DUNSTAN'S CLOCK
On the wall of St. Dunstan-in-the-West in Fleet Street is the first clock showing minutes ever to be made. It was also the first clock to have two dials. It was made in 1671.



CLOCKWORK REGULARITY. Normal bowel action is a fine thing to possess. It is, perhaps, the most sought after talisman against ill-health in the world. No wonder, then, if its temporary suspension leads from a mild despondency even to black despair. But in such a crisis panic measures are to be avoided—the taking of harsh purgatives eschewed.

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EMULSION

lished its position in the literature. (Stuttgart: Georg Thieme, DM 19.50.)

The Brute, by Guy Des Cars, is an interesting study, in the form of a novel, of the problem of the blind deaf mute. There is a description of the methods which have been developed in France for training these unfortunate people to communicate with their fellow-beings, and this is cleverly worked into the form of a thriller. As a study of an unusual facet of human nature, this book will be appreciated by doctors. According to the dust cover, which incidentally is the worst feature of the book, this novel 'has created a sensation in France'. (Allan Wingate price 9*s.* 6*d.*)

Italian Hospitals and Health Services, by John DODD, B.COMM., A.C.I.I., is an account of the International Hospital Federation's Study Tour in Italy this summer. It provides a most readable description of the present organization of the hospitals in Italy, the present state of which is summed up in the Lutherian quotation: 'well provided and solidly built; the food and drink is of good quality, the nurses are diligent, the doctors learned, beds and clothing spotlessly clean and the walls artistically decorated'. (British Hospitals Contributory Schemes Association (1948), Royal London House, Bristol, 1, price 7*s.* 6d.)

Progress and Hope in Tuberculosis 1951-1952 is the title of the NAPT Annual Report, which deals with all aspects of the Association's activities: the training of nurses, postgraduate lectures, Scandinavian scholarships for nurses, rehabilitation, housing; and sections are devoted to the Scottish and Northern Branches, Commonwealth affiliated Associations, new drugs, protective vaccination, the treatment of British children in Denmark, work in colonial territories, and many other items of interest. (NAPT, Tavistock House North, Tavistock Square, London, W.C.1.)

Distressed Gentlefolk's Aid Association.—The 55th Report of the executive committee announces the acquisition of a new headquarters building, where all the central activities of the Association are now carried out under one roof with a considerable saving in expense. The new home for chronic sick, Laverstock, Tunbridge Wells, is now open and, with the other houses in Surrey, Berkshire and Worcestershire, is running smoothly. To maintain these homes and to provide grants to needy persons, funds are urgently needed. (Artillery House, 10 Knaresborough Place, London, S.W.5.)

OFFICIAL PUBLICATIONS

Hospitals' Directory: England and Wales, 1952.—In this new edition there is much more information concerning the types of hospital, training facilities, and the like. The areas of the 14 Regional Hospital Boards are given, with addresses and telephone numbers, Boards of Governors of Teaching Hospitals, Hospital Management Committees, and the names of the hospitals for which they are responsible. There is a good index. (H.M. Stationery Office, price 10*s.* 6*d.*)

Biologie d'Anopheles gambiæ, by M. H. Holstein, DR. ÉS SC.—In 176 pages the author presents his observations on *Anopheles gambiæ* in French West Africa and reviews the earlier literature (392 pages). It is not surprising that so widespread a species as *A. gambiæ* should show biological variation, but reliable criteria for determining 'races' are not available and Dr. Holstein suggests the use of the maxillary index. Nevertheless, should we not cease to regard a 'species' and its 'races' as constants unalterably fixed for all time and think of them as dynamic entities varying according to local conditions? This book will be indispensable to the malariologist working in Africa and its English edition will be eagerly awaited. (Geneva: WHO, 1952; London: H.M. Stationery Office, price 10*s.*)

OFFICIAL NOTICE

Reduction of Practitioners' Lists.—Two Ministry of Health Memoranda (E.C.L. 82/52; E.C.N. 108) describe the arrangements which have been made, in agreement with the British Medical Association, for the payment of partners on 'notional lists' and for applying the new maxima to lists of patients. It is hoped that the new basis of payment will come into operation during the quarter beginning April 1, 1953, and it is proposed to allow a year from that date, i.e. up to April 1, 1954, for lists to be brought within the new limits proposed by the Working Party. Practitioners are reminded that the new maxima are: 3,500 for a single-handed practitioner; 4,500 for a member of a partnership, provided the average for the partnership is not above 3,500; and 2,000 in respect of the employment of a permanent assistant; 'with, in addition, a tolerance of up to 190'. At the end of the period allowed for adjustment, a practitioner who has still a list above the new maxima will be entitled to payment only on the new maxima plus a tolerance of 100. A tolerance of 100 may be allowed in respect of each partner in a partnership, and a tolerance of 50 in respect of an assistant.

THE PRACTITIONER: 50 Years Ago. See page 693

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THE PRACTITIONER

Fifty Years Ago

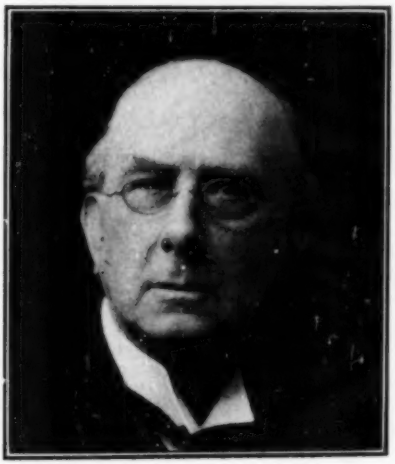
'There is a certain relief in change, even though it be from bad to worse; as I have found in travelling in a stage-coach, that it is often a comfort to shift one's position and be bruised in a new place'.—Washington Irving: *Tales of a Traveller.*

DECEMBER, 1902

WITH the present number Sir Malcolm Morris bids 'a long farewell to editorial greatness. For eight years I have ploughed a lonely furrow in the field of medical journalism, and I feel that the time has come for me to wend my way into retirement. *The Practitioner* came into my hands with a good name made by its former editors; and now, in my turn, I pass on the lamp to a younger and swifter runner, to whom I wish a long and brilliant course'. Sir Malcolm Alexander Morris, K.C.V.O., F.R.C.S.ED. (1849-1924) became editor of *The Practitioner* in 1895, when Macmillan and Co. disposed of the journal to Cassell and Co. 'The Month' owed its birth to him, and it ceased with his retirement. He was the first surgeon in charge of the skin department at St. Mary's Hospital, founded the *British Journal of Dermatology*, in 1888, and in 1906 joined the Board of Directors of Cassell and Co.

In an address on chauvinism in medicine to the Canadian Medical Association, Professor Osler 'treats of "the passing of the family physician", or, as we should say, the general practitioner . . . In this country the general practitioner is the one absolutely indispensable part of the professional machinery. He can never by any conceivable evolution be eliminated. On the other hand there is, I think, a distinct tendency to the elimination of the general physician. As knowledge grows specialisation must necessarily increase, and the physician of the old-fashioned type who took everything for his province that was not visibly and tangibly chirurgical is already beginning to disappear. He did not always limit his practice even within the wide boundaries which have been assigned to him. I have been informed that a former President of the Royal College of Physicians, who was translated, it may piously be hoped, to a higher sphere not many years ago, did not scruple to remove tonsils when he thought there was occasion for the operation. This, I take it, would be regarded by the laryngologists of the present day as an invasion of their territory'.

Dr. Nathan Raw, Physician to the Mill Road Infirmary, Liverpool, devotes an 'Original Communication' to a report of the First International Congress on Tuberculosis, held in Berlin from October 22 to 26, 1902, and attended by, among others, Malcolm Morris. An interesting discussion took place on the relation between human and bovine tuberculosis. 'A great many eminent scientists spoke, most of them being opposed to Professor Koch, and others not wishful to express any definite opinion. Professor Koch then rose to address a crowded chamber, and was listened to with rapt attention for nearly an hour and a half. In the most scientific and convincing way, he thoroughly corroborated his views expressed a year ago in London, and was of the opinion that the severe measures concerning bovine tuberculosis prescribed by the sanitary laws were not justified, and that the money required for that purpose would be better spent in building sanatoria and improving the dwellings of the poor. People were not liable to contract tuberculosis through the medium of their food'.



Sir Malcolm Morris, K.C.V.O., F.R.C.S. (1849-1924)

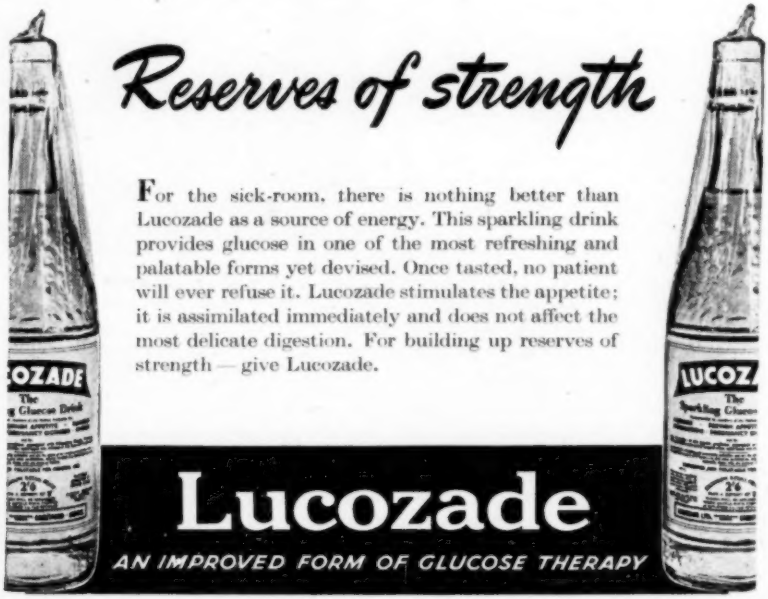
W. Bruce Clarke, M.B., F.R.C.S., Assistant Surgeon and Lecturer on Anatomy, St.

FIFTY YEARS AGO—*continued*

Bartholomew's Hospital, in 'A Clinical Lecture on Congenital Dislocation of the Hip' confesses to be 'absolutely in the dark' concerning its etiology. 'The indications for treatment', he goes on to say, 'are very easy to lay down on paper, but they are by no means easy to carry out in practice . . . In the marked cases the only form of treatment which will give a satisfactory result is operation'. Bruce Clarke (1850-1914) served as house surgeon to Sir William Savory at St. Bartholomew's Hospital, and was appointed assistant surgeon in 1883 and full surgeon in 1902. A good surgeon and a popular teacher, he was a great walker who thought nothing of going on foot from Oxford to London in one day. His fondness for boxing won him the nickname 'The Bruiser'.

A number of interesting books are reviewed this month. Of the fifth edition of 'Artificial Feeding and Food Disorders of Infants' by W. B. Cheadle, Consulting Physician to the Hospital for Sick Children, Great Ormond Street, edited and revised by F. J. Poynton, Assistant Physician to the Hospital, we are told that 'probably no more lucid and concise account of the problems of infant feeding has been written'. 'Acute Infectious Exanthemata' by W. T. Corlett, Professor of Dermatology and Syphilology, Western Reserve University, 'is intended to be practical . . . The author expresses his desire to present the subject in the light of modern research; but as he starts with the plague in Egypt, and traces one of the fevers into China in the dynasty of Tcheou, which began in 1122 B.C., we cannot complain that he has neglected the less modern aspect of his theme . . . We confess that . . . we were somewhat shocked by the repeated use of the phrase "scarlatina sine exanthemata", which reminds us of the would-be-correct gentleman who talked of "omnibi". Why will not scientific writers use plain, honest English, if their general education is not sufficient to avoid such hideous blunders? . . . We note that the chapter on Rubella makes no reference to "the fourth disease", and we are left in wonder whether silence means consent or contempt'. The reviewer of the English edition of 'Nothnagel's Encyclopedia of Practical Medicine' notes with interest that in Germany hay fever is called 'Bostock's Summer Catarrh', after John Bostock who described the disease before the Royal Medico-Chirurgical Society in 1819. He doubts whether the size of 'a silver 20-penny piece' is more illuminating to the British reader than the proverbial 'piece of chalk'.

W.R.B.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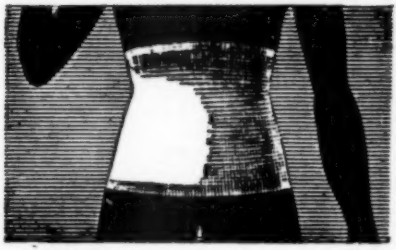

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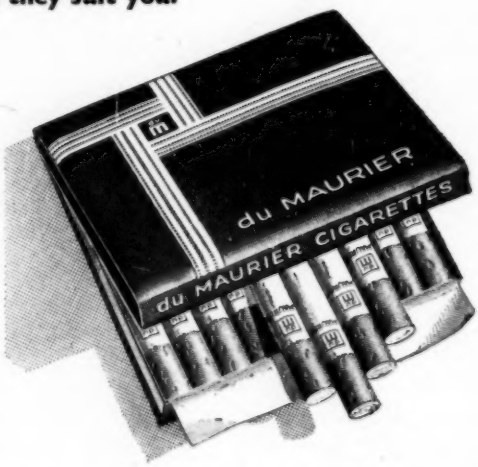

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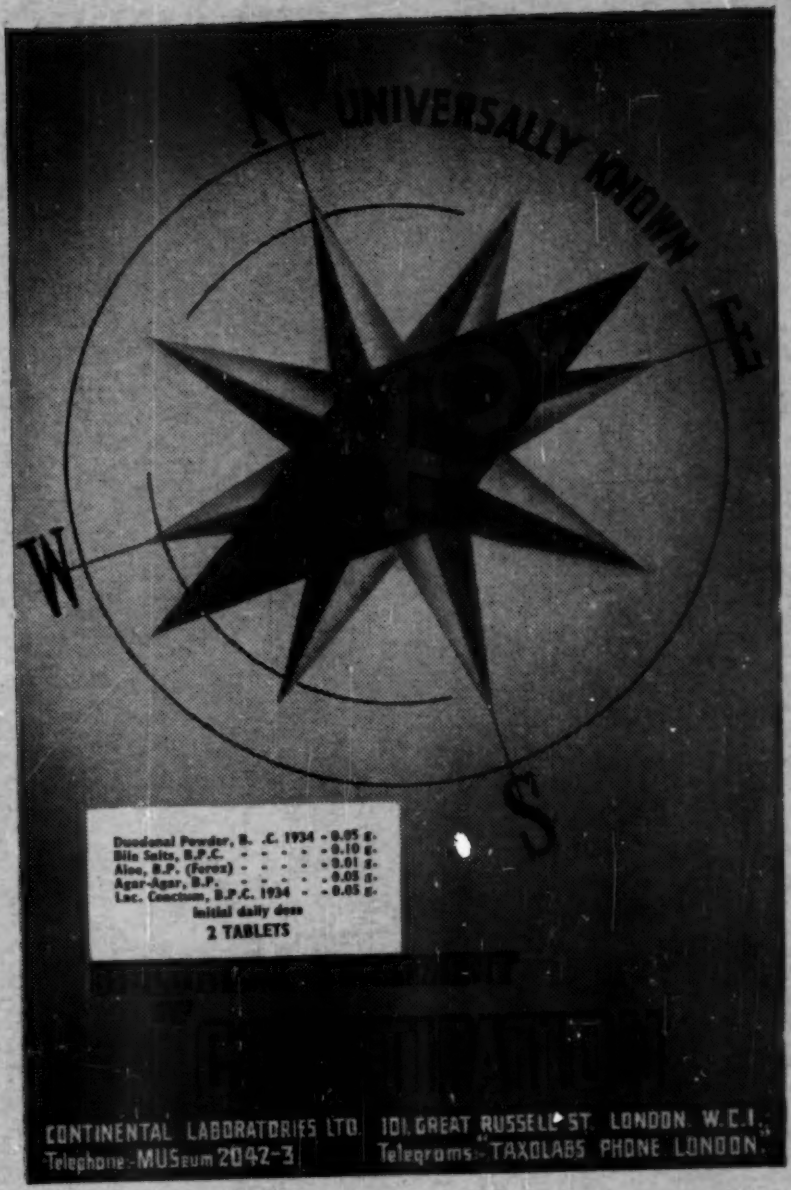
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